

THE IRON AGE

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & 102 Reade St., New York.

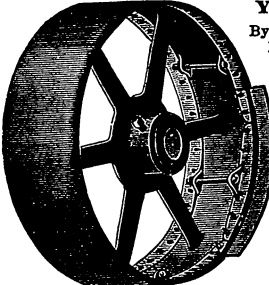
Vol. LIII: No. 13.

New York, Thursday, March 29, 1894.

\$4.50 a Year, including Postage.
Single Copies, Ten Cents.

Reading Matter Contents..... page 624
Classified List of Advertisers.... " 91
Alphabetical Index to Advertisers " 95
Advertising and Subscription Rates " 643

**SAVE YOUR POWER.
YOUR BELTS.
YOUR MONEY**



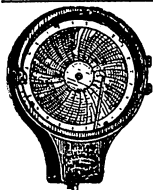
By covering your pulleys with
SHULTZ Patent Leather Pulley Covering
Send for Circular to
SHULTZ BELTING CO.,

ST. LOUIS, MO.
NEW YORK, N. Y., 225 Pearl St., A. B. Laurence, Mgr.
BOSTON, MASS., 164 Summer St., G. J. Kelley, Mgr.
PHILADELPHIA, PA., 129 N. 3d St., J. Garnett, Mgr.

VALLEY STEEL CO.,

ST. LOUIS,
Manufacturers of

**STEEL CUT NAILS,
RAILS,
CHANNELS AND MERCHANT STEEL.**



Every Steam Plant
Should be provided with
**BRISTOL'S RECORDING
PRESSURE GAUGE.**

Low in Price and Guaranteed.
Send for circulars and fac-simile
chart.

THE BRISTOL CO.,
Waterbury, Conn.

BRAIDED CORD.



Samson and Massachusetts Brands.

Send for Samples.

SAMSON CORDAGE WORKS, Boston, Mass.

TURNBUCKLES.



BRANCH OFFICE: 136 Liberty St., New York.
Cleveland City Forge and Iron Co., Cleveland, O.

Jobbers Carrying a large Stock of the Wilmot & Hobbs Mfg. Co. Celebrated Copperized Oilers.

Russell & Erwin Mfg. Co.,	NEW YORK.
Sargent & Co.,	
Green, Tweed & Co.,	BOSTON.
Montgomery & Co.,	
The Bigelow & Dowse Co.,	PHILA., PA.
Frye, Phelps & Co.,	
The Dana Hardware Co.,	CHICAGO.
Baldwin, Robbins & Co.,	
Biddle Hardware Co.,	ST. LOUIS.
Horton, Gilmore, McWilliams & Co.,	
Hibbard, Spencer, Bartlett & Co.,	CLEVELAND.
Fairbanks, Morse & Co.,	
Charles H. Besley & Co.,	DETROIT.
A. F. Shapleigh Hardware Co.,	MILWAUKEE.
L. M. Rumsey Mfg. Co.,	CINCINNATI.
M. M. Buck & Co.,	LOUISVILLE.
Cahill, Collins & Co.,	
The Geo. Worthington Co.,	INDIANAPOLIS.
McIntosh, Huntington Co.,	DES MOINES, IOWA.
Fletcher Hardware Co.,	SIOUX CITY, IOWA.
Buhl Sons & Co.,	DUBUQUE, IOWA.
John Fritzlauff Hardware Co.,	KANSAS CITY, MO.
Rundell-Spence Co.,	OMAHA, NEB.
Howell, Gano & Co.,	DENVER, COL.
Hart Hardware Co.,	SAN FRANCISCO, CAL.
W. B. Belknap & Co.,	LONDON, ONT.
Layman, Carey & Co.,	TORONTO, ONT.
Patrick & Luthie Co.,	
Knapp & Spaulding Co.,	
A. Tredway & Sons Hardware Co.,	
Richards & Conover Hardware Co.,	
Rector & Wilhelm Co.,	
Hendrie & Bolthoff Mfg. Co.,	
Baker & Hamilton,	
Hobbs Hdw. Co.,	
Rice, Lewis & Co.,	
Alkenhead Hardware Co.,	
Wood, Van Lence & Co.,	
Caverhill, Learmont & Co.,	

AND MANY OTHER PROMINENT JOBBERS.

YOU WILL NEVER MISS A BIRD IF YOU USE U. M. C. PAPER SHELLS.

"Trap Shells."

TRAP SHELLS (green color) are equal to the best imported; have conical base, are water-proofed, have an extra strong primer with a battery cup, are METAL REINFORCED, are WARRANTED gas tight and adapted to HEAVY loads of nitro powders. Can be reloaded many times.

"Smokeless Shells."

SMOKELESS SHELLS (salmon color) are the same as the Trap Shell except that they are not metal REINFORCED, but intended for MODERATE charges only of nitro-powders, which should not exceed 3 1/2 (measured for 12 gauge, or 3 3/4 drams for 10-gauge).

"New Club."

NITRO CLUB SHELLS are designed to meet the demand for a moderate priced shell adapted to nitro-powders. They are the same as our celebrated "New Club" shells, but they have special strong primers (except in these shells) and a new form of base, thereby giving quick ignition. Combustion to moderate charges of nitro-powder.

"New Club."

NEW CLUB SHELLS are designed for use with black powders. Conical base, primed with the celebrated U. M. C. No. 2 primers. All sizes and lengths.

The Union Metallic Cartridge Co., Bridgeport, Conn.

RANDOLPH & CLOWES, WATERBURY, CONN.,

Manufacturers of Seamless Drawn Brass and Copper Tubing and Large Shells, Brazed Tubes and Mouldings, Sheet Brass, Sheet Copper, German Silver.

—SOLE MANUFACTURERS OF—

Brown's Patent Seamless Drawn Copper House Boilers.

CANNOT COLLAPSE. WILL NOT LEAK.

Ordinary weight tested to 200 lbs., extra heavy to 300 lbs. pressure per square inch. Made of two Seamless Drawn Copper Shells. Handsomest, best and strongest and safest boiler in the market and cheapest in the end. Send for circular and instructions to prevent accidents from freezing, &c., &c.



TO THOSE INTERESTED IN OR USING VALVES.

We have recently made improvements in the manufacture of **JENKINS BROS.' VALVES** having increased the number of bolts, thickness of flanges, &c.

We shall manufacture one grade of valve only, suitable for high or low pressure steam. The Jenkins Discs used in these valves are suitable for high or low pressure. We guarantee all valves stamped with Trade-Mark.

JENKINS BROS.,

NEW YORK. PHILADELPHIA. BOSTON and CHICAGO.

COPPERIZED C. R. SWEDOH, ALSO NICKEL PLATED

FOR THE CONVENIENCE OF
RETAIL HARDWARE and MILL SUPPLY HOUSES

We have arranged with all of the principal
Jobbing Houses in the Country to carry

A Large Stock of our

CELEBRATED OILERS

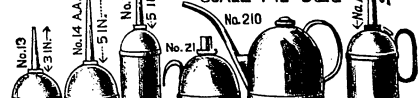
AND QUOTE THEM AT BOTTOM PRICES.

These Oilers are very durable, substantial and beautiful, and sell at sight. The character of the Jobbing Houses fully vouches for their excellence.

Please send your inquiries and orders to your nearest Jobber and facilitate delivery and lessen transportation expenses.

STEEL ANTI-RUST OILERS & C.

ALL SIZES & BURNISHED FINISH
STYLES CHEAP & ELEGANT



LARGE STOCK, BEST OF GOODS & FACILITIES
THE WILMOT & HOBBS MFG. CO
HOT & COLD ROLLING MILLS AND FACTORIES
BRIDGEPORT, CONN. U. S. A.
STORE, 20 MURRAY ST. NEW YORK.

Rainey Connellsville Furnace and Foundry Coke.

The only Coke you can buy and know you are getting the best that can be manufactured. All our works in the heart of the Region, within four miles of Connellsville, Pa.

CAPACITY 4,000 TONS DAILY.

W. J. RAINEY, MAIN OFFICE: **CLEVELAND, OHIO.**
Mercantile Bank Building.

THE
ANSONIA BRASS
AND COPPER CO.
MANUFACTURERS OF
BRASS AND COPPER
Seamless Tubes, Sheets, Rods and Wire.

Ingot Copper.

SOLE MANUFACTURERS

Tobin Bronze

(TRADE-MARK.)

Condenser Plates, Pump Linings, Wire, Round,
Square and Hexagon Bars, for Pump
Piston Rods and Bolt Forgings.

19 & 21 Cliff Street, - - New York.

THE
New Haven Copper Co.,
SOLE MAKERS OF

POLISHED COPPER

Under Patent of T. James, Sept. 12, 1876.

ALSO MANUFACTURERS AND

DEALERS IN

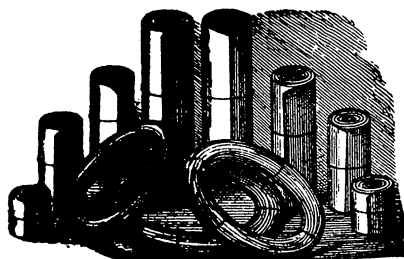
BRAZIERS' & SHEATHING COPPER.

Kettles, Bottoms, Bolts, Circles, &c.,

ALSO MANUFACTURERS OF

Cast Steel Augers and Bits of Superior Quality.

294 Pearl St., NEW YORK.



Waterbury Brass Co.

Established 1845.

Sheet, Roll and Platers' Brass,

German Silver, Copper, Brass and Ger-
man Silver Wire, Brass and
Copper Tubing,

**COPPER RIVETS AND BURS,
PERCUSSION CAPS,
TAPE MEASURES,
METALLIC EYELETS,**

Brass Kettles, Brass Tags, Powder Flasks,
Shot Pouches, &c.,
AND SMALL BRASS WARES OF EVERY DESCRIPTION.

HICK'S PRIMERS. BERDAN PRIMERS.
*Cartridge Metal in Sheets or
Shells a Specialty.*

Sole Agents for the CAPEWELL MFG. CO.'S
Line of Sporting Goods.

DEPOTS:

296 Broadway, New York. 125 Eddy St., Provi-
dence, R. I.

MILLS AT WATERBURY, CONN.

WHEN IN WANT OF
ANYTHING IN

**BRASS
AND
COPPER**

WRITE

ROME BRASS & COPPER CO.,
ROME, N. Y.

THE PLUME & ATWOOD MFG. CO.

MANUFACTURERS OF

Sheet and Roll Brass

—AND—

WIRE,

GERMAN SILVER AND GILDING METAL,
COPPER RIVETS AND BURS, COP-
PER ELECTRICAL WIRE,

Pins, Brass Butt Hinges, Jack Chain,
Kerosene Burners, Lamp
Trimmings, &c.

18 MURRAY ST., NEW YORK.

71 PEARL ST., BOSTON.

90 MARKET ST., CHICAGO.

ROLLING MILL,
THOMASTON, CONN.

FACTORIES:
WATERBURY, CONN.

SCOVILL MFG. COMPANY,

Manufacturers of

BRASS

Sheet, Wire, Tubes.

BUTT HINGES,

BUTTONS,

LAMP GOODS,

NOVELTIES.

PURE ALUMINUM

INGOT and SHEETS.

FACTORIES, WATERBURY, CONN.

DEPOTS:

433 Broome Street, New York.

210 Lake Street, Chicago.

29 High Street, Boston.

JOHN DAVOL & SONS,

AGENTS FOR

Brooklyn Brass & Copper Co.,

DEALERS IN

**COPPER, TIN, SPELTER,
LEAD, ANTIMONY.**

100 John Street, - - New York.

WILLIAM S. FEARING.

100 Chambers St., NEW YORK,

SELLS TO THE TRADE

Sheet Brass, Fancy Sheet Brass,

German Silver, Copper, Brass

and German Silver Wire,

Brazed and Seamless Brass and

Copper Tubes, Brass and Cop-

per Rods, Brass Ferrules,

Pure Copper Wire,

Sheet and Ingot Copper, Spelter,

Tin, Antimony, Lead, &c.

BRASS GOODS MFG. CO.,

Mfrs. of Stamped Brass, Silver and Nicked Goods, Brass Labels for Cans and Rubber Moulds,

BRONZE DOOR KNOBS

Brass and Plated Roses, Combined Rose and Escutcheon Plates, Socket Shells, &c., Patent Mirror Pin
Cushion Business Cards, Mucilage Brushes. Novelties of new design made to order.

SALESROOM: 88 Chambers St., New York. FACTORY: 86-92 Third St., So. Brooklyn.

HENDRICKS BROTHERS,

Proprietors of the

Belleville Copper Rolling Mills.

Manufacturers of

Braziers', Bolt and Sheathing

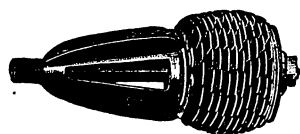
COPPER.

COPPER WIRE AND RIVETS.

Importers and Dealers in

Ingot Copper, Block Tin, Spelter, Lead, Antimony, etc.

49 CLIFF ST., NEW YORK.



6 Inches and Over.

The Peerless STEEL
FLUE CLEANER.

FROM 1 1/4 TO 16 IN.

For descriptive circular and prices ad-
dress the Manufacturer,

Jas. T. Mackay, St. Louis, Mo.

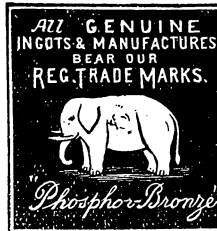


Under 6 Inches

**MISSOURI
METAL COMPANY,**
923 Security Building,
ST. LOUIS.

SPELTER.

**ELEPHANT
BRAND**



PHOSPHOR-BRONZE
INGOTS, CASTINGS, WIRE, SHEET &c.
THE PHOSPHOR BRONZE SMELTING CO. LIMITED
2200 WASHINGTON AVE. PHILADELPHIA, PA.
ORIGINAL MANUFACTURERS OF PHOSPHOR-BRONZE IN THE UNITED STATES AND SOLE
MAKERS OF "ELEPHANT BRAND" PHOSPHOR-BRONZE.

**PHOSPHOR
BRONZE.**

Parsons' Manganese Bronze and White Brass.

MADE IN THE UNITED STATES EXCLUSIVELY BY

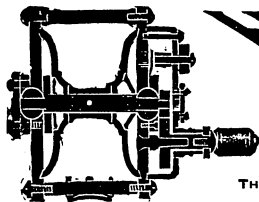
THE WILLIAM CRAMP & SONS SHIP and ENGINE BUILDING CO.,
PHILADELPHIA, PA.
MANGANESE BRONZE PROPELLERS

— ARE USED BY THE —

Cunard, Pacific Mail, Hamburg American, White Star, International,
Morgan, Canadian Pacific, North German Lloyds and many
other Steam Ship Companies, and principal Naval Powers.

Parsons' White Brass; the Most Approved Anti-Friction Metal.

G. DOUGLAS PETRIE, Agent, - Nos. 39 & 41 Cortlandt Street, New York.



HENDRIX
Solicits Correspondence about
Fishing Reels for 15 Cents to 20 Dollars each.
Brass Bird Cages " 50 " " 12 " "
Japanned " " 25 " " 10 " "
Standard Bronze, Brass and Steel Chain.
Standard Wire Picture Cord.

THE ANDREW B. HENDRIX CO., NEW HAVEN, CONN., U. S. A.



THE F. L. GAYLORD CO.,
— MANUFACTURERS —

Aluminum Bronze Castings, Aluminum Bronze Sheets, Alu-
minum Bronze Ingots and Pure Aluminum
Castings.

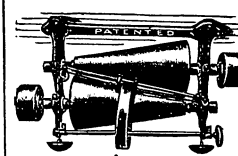
Box 1417, Ansonia, Conn.

Rough Casting of Aluminum.

Aluminum Bronze, German Silver Bronze and all
kinds of Metals. Manufacturers of Chandeliers, Metal
Picture Frames, Ink Stands, Figures, Statues, etc.
Stair Carpet Holders a Specialty.

St. Louis Bronze & Aluminum Works,
3741-3743 North Broadway,
ST. LOUIS, MO.

EVANS FRICTION CONES.



For regulating the
speed of machines au-
tomatically or by hand.
Thousands of sets in
operation driving all
kinds of machinery
which require from 1
to 50 H.P. Address
Evans Friction Cone Co.,
85 Water Street,
Boston, Mass.

THE CRESCENT TRY IT!
AND YOU WILL USE NO OTHER

**THE CRESCENT BRAND
PHOSPHOR
TIN.**

THE HIGHEST
RICHEST GRADE MADE

MANUFACTURED ONLY BY
THE CRESCENT PHOSPHORIZED METAL CO
OFFICE AND WORKS PHILADELPHIA, PA.
2107 2109 AND 2111 INDIANA AV.

CROWN SMELTING COMPANY,

Chester, Pa.

Bronze, Brass and Composition Castings.

Inventors and Sole Manufacturers of

"Crown Bronze" Bearing Metal and "Crown ROLLING MILL Babbitt Metal."

Manufacturers of PHOSPHOR-BRONZE TO PENNSYLVANIA RAILROAD.

Specifications in ingot metal or castings.

The W. W. & R. M. KEYS CO.,

Bronze,
Composition
and
Brass
Castings
of all kinds,
also
Babbitt
Metals

BRIDGEPORT, CONN.

PHOSPHOR-TIN

BY USING MY PHOSPHOR TIN MANUFACTURERS CAN MAKE ANY DESIRED GRADE OF PHOSPHOR BRONZE THEMSELVES BY THE SIMPLE PROCESS OF MELTING, MUCH CHEAPER THAN THEY ARE NOW TO BE HAD IN THE MARKET—NEW OR OLD COPPER CAN BE USED. FOR CIRCULARS AND PRICES ADDRESS **HALK & NAUMANN**, NEW-YORK. SOLE AGENTS FOR THE U.S. AND CANADA. 3 PEARL

The American Metal Co.

(LIMITED),

Levin Building, 80 Wall St., New York.
P. O. BOX 957.

COPPER, COPPER ORES AND MATTES.
TIN, LEAD, SPELTER, ANTIMONY, NICKEL,
ALUMINUM, BULLION, IRON.

Advances made on Consignments.

AGENTS FOR

Henry R. Merton & Co., - - London
Metallgesellschaft, Frankfort-on-Main.
Williams, Foster & Co. Ltd., Swansea.

BEST, FOX & CO.,

25th Street and A. V. Ry. - PITTSBURG, PA.

SOLE MANUFACTURERS OF

CLIMAX BRONZE

FOR ALL PURPOSES.

CASTINGS from 1 oz. to 12,000 lbs.

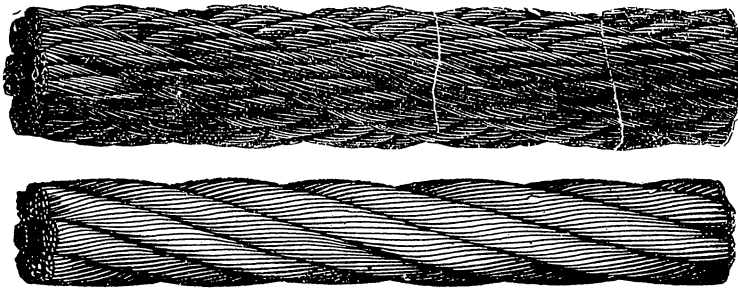
A

Washburn & Moen Manuf'g Co.,

WORCESTER, MASS., NEW YORK CITY, CHICAGO.
MAKERS OF IRON, STEEL AND COPPER

EVERY VARIETY OF **WIRE** FOR ALL PURPOSES.
WIRE ROPE AND CABLE.

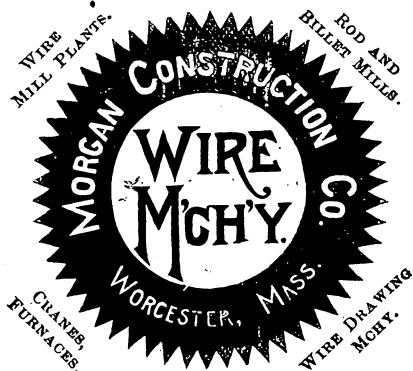
Hard and Soft Drawn Copper Wire for Electrical Purposes; Galvanized Iron and Steel Telegraph and Telephone Wire; Glidden Patent Steel Barb Wire; Watch and Clock Main Springs; Eyeglass Springs; Steel Wire for Needles and Drills; Patent Steel Wire Bale Ties; Pump Chain; Two Strand Twisted and Flat Twisted Fence Wire without Barbs; Fence Staples, Stretchers, &c.; Bright, Annealed, Tinned and Galvanized and Copper Wire, on Spools 1 oz. to 1 lb



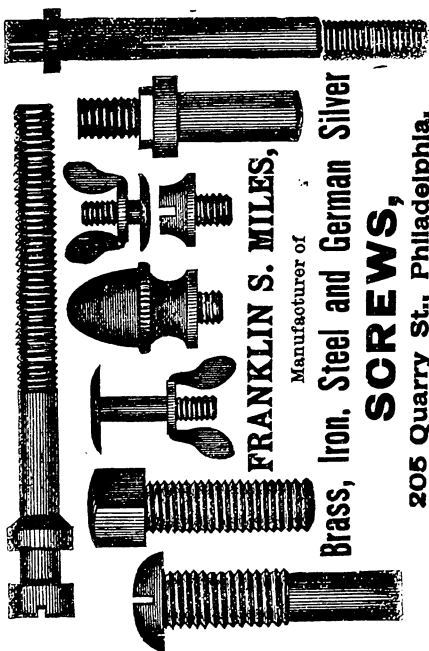
Galvanized Iron Wire Rope for Ships' Rigging, &c. Galvanized Steel Wire Cables for Suspension Bridges. Transmission and Standing Ropes, Hoisting Ropes, Tiller Ropes, Switch Ropes, Copper, Iron and Tinned Sash Cord, Phosphor Bronze and Copper Wire Rope, Wire Clothes Lines, Picture Cord, Galvanized Wire Seizing, and all the Fixtures and Appliances required for use with the foregoing. The famous yachts Mayflower, Volunteer and Sachem are all rigged with our Wire Rope.

SEND FOR PRICE-LISTS, CIRCULARS AND DESCRIPTIVE PAMPHLETS.

New York Warehouses, 16 Cliff St., and 241 Pearl St. Chicago Warehouse, 107 & 109 Lake St. San Francisco Warehouse, 8 & 10 Pine St.

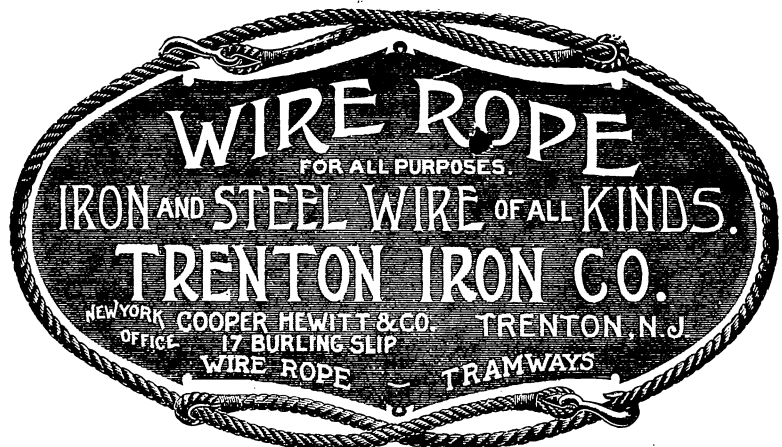
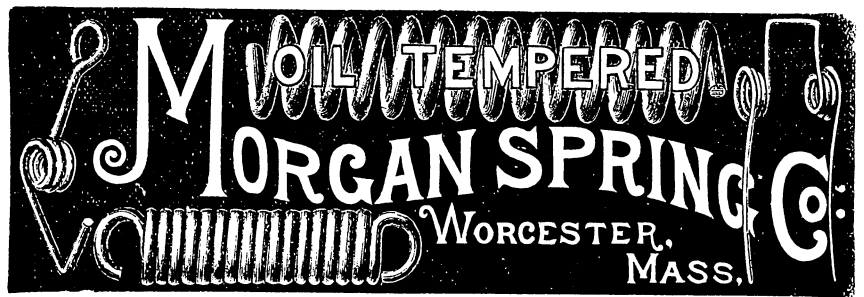


WM. MCFARLAND,
IRON FOUNDER,
TRENTON, - - N. J.
Chilled Cast Wire DIES
A SPECIALTY.
Any Size or Style Made at Short Notice.



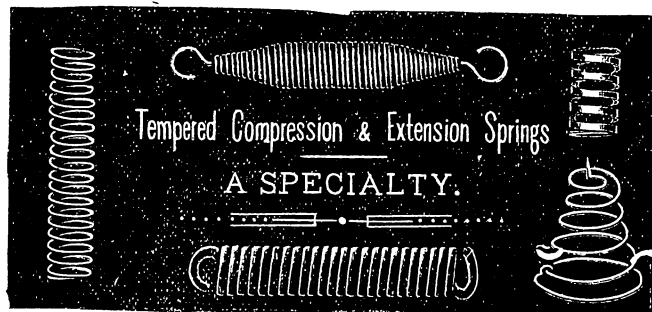
SPRINGS—RIVETS.

Specialties in
SHEET METAL WORK,
CLOCK and INDICATOR POINTERS,
CLARK & COWLES, Plainville, Ct.



MILLER & VAN WINKLE,
MANUFACTURERS OF
STEEL WIRE AND STEEL SPRINGS.

TEMPERED STEEL WIRE.



MACHINERY SPRINGS.

OFFICE AND WORKS: }
18 to 24 Bridge Street, } BROOKLYN, N. Y.

VOLUTE,
WIRE
and
FLAT STEEL

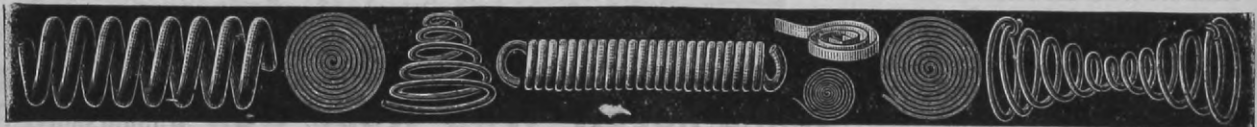
SPRINGS

FOR Agricultural Implements, Machinery and various other purposes.
Write for prices to
SABIN MACHINE CO.,
MANUFACTURERS.
MONTPELIER, VT.



117th to 118th Street and Harlem River.

General Offices, Foot 118th Street, New York.



Makers of Iron, Bessemer, Siemens-Martin and Crucible Cast Steel Wire of all kinds, annealed, soft and hard drawn; Coppered Spring Wire for Furniture Springs, &c., Coppered Soft Wires, Baling Wires, Suspension Bridge and Rope Wires of all kinds, &c.

STEEL MUSIC WIRES and MUSIC SPRING WIRES,

UNRIVALED FOR PIANOFORTE STRINGS.

FOR THE HIGHEST CLASS OF SPRINGS.

Specialty of finest Cast Steel Wires, round, flat, square and any other shape, tempered and also in the soft state, guaranteed to harden and temper. Solid Rib and Paragon Umbrella Wires. Crinoline, Corset, Shade Roller, Lock, Hat, Brush, Saw, Band Saw, Clock Spring, Clock Bell, Clock Verge and Watch Spring, Rule and Tape Line and Eyeglass Wires, &c. Piano, Needle, Fish Hook, Drill and Hair Spring Wires. Special Cast Steel Wires of any kind made for special purposes. Also Covered Wires—Braided and Cloth and Paper Covered—for crinoline, corset and other purposes. Cold Rolled and Silt soft and Tempered Steel Strips of all kinds and for all purposes.

Special Wires and Springs of Every Description.

CORRESPONDENCE SOLICITED.

SAMPLES FURNISHED ON APPLICATION.

SUPERIOR STEEL COMPANY,

PITTSBURGH, PA.

MANUFACTURERS OF

Hot Rolled of any Exact Width up to 10 in. From No. 20 W. G. to 2 in. thick.

STRIP STEEL

Cold Rolled from 10 in. to 1-4 inch wide. Of Exact Thicknesses, from 3-16 in. to .005 in.

Bessemer, Open Hearth Soft, Special Soft and Spring, Crucible Cast Spring and Tool Steel, Clock Spring, Watch Main Spring, &c., &c.

WORKS LOCATED AT MANSFIELD, PA.

Capacity 30 Tons per Day.

EASTERN REPRESENTATIVES:

Ely & Williams, 38 Park Row, New York; 1239 Market St., Philadelphia, Pa.

Wire Cloth AND Wire Goods

Hardware Grade and Fanning Mill Wire Cloth, Poultry Netting, Heavy Window Screen Wire Cloth, Coal and Sand Screens, Riddles, Ash Sieves, &c., &c.



Office and Counter Railings, Elevator Enclosures, Wire Stall Guards, Hay Racks Feed Boxes, Window Guards, &c., &c.

BUFFALO, N. Y.

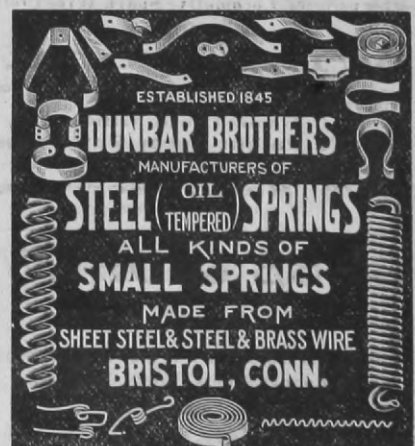
THE CELEBRATED

"SILVER FINISH"

GALVANIZED POULTRY NETTINGS.

FOR SALE BY THE HARDWARE TRADE.

GET THE BEST.



Coal Pits and Pitmen. By R. NELSON BOYD. A short History of the Coal Trade and the Legislation Affecting it. Illustrated, 12mo, cloth,\$1.50 For sale by DAVID WILLIAMS, 96-102 Reade St. N. Y.

**Always
Ask
For**



Unequaled for Strength
and Durability.

Made Only by

Broderick & Bascom Rope Co.,
St. Louis, Mo.

**HOWSON
AND
HOWSON**

Counsellors at Law
Solicitors of Patents

PHILADELPHIA
Forrest Building, 119 S. 4th St.
NEW YORK
Potter Building, 38 Park Row.
WASHINGTON
Atlantic Building, 928 F St.

PATENTS

U. S. and Foreign Secured.

Trade Marks and Copy Rights. Twenty Years' Experience. Send model or sketch and brief description of your invention for Free report as to patentability. Expert searches and opinions as to Scope, Validity and Infringement. Patent Causes Prosecuted and Defended. Practice in U. S. Supreme, Circuit and Circuit Appeals Courts, and U. S. Patent Office.

Send for "Plain Words about Patents," Free.

PATENT PRACTICE EXCLUSIVELY.
References Furnished on Application.

E. B. STOCKING, Attorney at Law,
611 F ST., N. W., WASHINGTON, D. C.

PATENTS.

H. W. T. JENNER, Patent Attorney and Mechanical Expert. 519 Seventh St., Washington, D.C. Charges moderate. Write for terms. Established 1893.

CHARLES N. BUTLER, C.E.,

ATTORNEY IN PATENT CASES,

611 Mutual Life Building,
Tenth and Chestnut Sts., PHILADELPHIA, PA.

Formerly of the Examining Corps,
U. S. Patent Office.

W. S. ESTEY,

No. 65 FULTON ST., NEW YORK,

MANUFACTURER OF

WIRE CLOTH

Of Brass, Copper, Iron, Galvanized and Steel Wire of all meshes and grades. For Mining, Milling and all other purposes. Locomotive Spark Wire Cloth, &c.,

—AND—

WIRE WORK

For Bank, Office and Counter Railing, Store Fronts Window Guards, &c.

Galvanized Twist Netting.

Oliver's Patent Decoy Rat Traps.

S T Pat. Adjustable Foundry Riddles.

S T Sand Screens.

SEND FOR CATALOGUE.

COBB & DREW,

PLYMOUTH, MASS.

Manufacturers of Norway Iron Rivets, Brass and Copper Rivets, Burrs, Washers, D. P. Tacks and Staples.

New York Agency, James S. Henderson, successor to Disoway & Henderson, Hardware.

Agents for Philadelphia Star Carriage and Tire Bolts.

A. LESCHEN & SONS' ROPE CO.,
MANUFACTURERS OF

Trade-Mark.



Registered.

ST. LOUIS, MO.

CORRESPONDENCE INVITED.



Williamsport Wire Rope Co., Williamsport, Pa.



WAREHOUSES: 87 Liberty St., New York.

WORKS
Wilkesbarre, Pa.

NEW HAVEN WIRE MFG. CO.,

Manufacturers of

WIRE

in great variety.

NEW HAVEN,

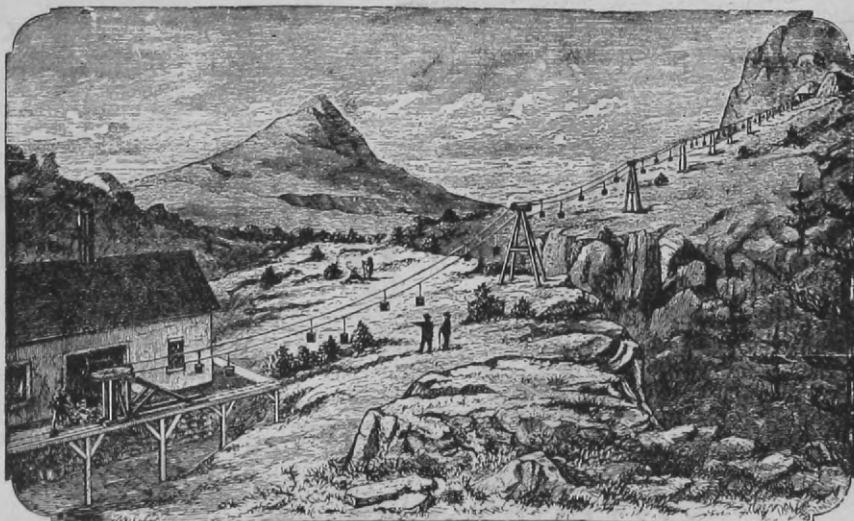
CONN.

Represented in New York by HENRY B. NEWHALL CO., 105 Chambers St.

CALIFORNIA WIRE WORKS,

509-511 Market St.,

San Francisco, Cal.



MANUFACTURERS OF


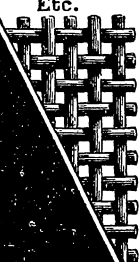
WIRE ROPE FOR CABLE RAILWAYS AND MINING PURPOSES.

HALLIDIE'S PATENT WIRE ROPEWAY,

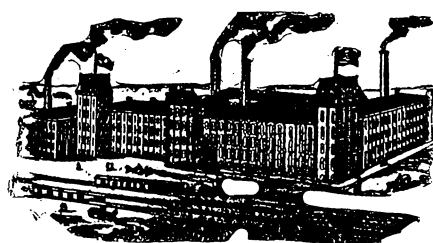
Simplest and most economical means of transportation. Send for Illustrated Catalogue.

HOWARD & MORSE
45 FULTON ST.
NEW YORK.
HEAVY MINING
COPPER,
BRASS,
STEEL
OR IRON
WIRE CLOTH.

ALSO
 MANUFACTURERS OF
GENERAL
WIRE WORK.
 Window Guards,
 Stable Fixtures,
RAILINGS,
 Sand Screens
 Coal Screens
 Etc.

WICKWIRE BROTHERS, **CORTLAND, N. Y.**
 MANUFACTURERS OF
Wire Cloth and Wire Goods,



Coal Sieves,
 Flour Sieves,
 Corn Poppers,
 Dish Covers,
 Metallic
 Coal Sieves.

NEW PROCESS
Cortland
POWER LOOM
WIRE CLOTH.

Every roll wrapped in Pink Paper
 and has our name on label.

Kilmer Manufacturing Co.

—Newburgh, N. Y.

Manufacturers of

BALE TIES

For Baling
 Hay, Straw,
 Rags,
 Excelsior, &c.

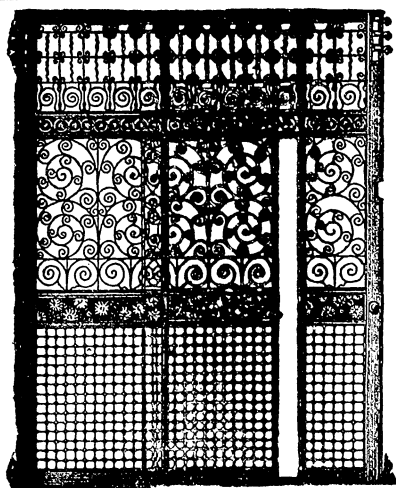
ALSO WIRE RODS, BARB WIRE, COILED STEEL WIRE, WIRE STAPLES, GALVANIZED WIRE, ORNAMENTAL FENCING, &c., &c.

Western Warehouse, 543 and 545 State Street, Chicago, Ill.

Western Office 21 Quincy Street, Chicago, Ill.

New York Office, 111 Water Street, New York City.

Works and General Office, Newburgh, N. Y.



Elevator Enclosures.

Brass Wire and Iron Railings in plain or fancy designs.

Wire and Wrought Iron Fences and Window Guards

WRITE FOR CATALOGUE.

LUDLOW-SAYLOR WIRE CO.,

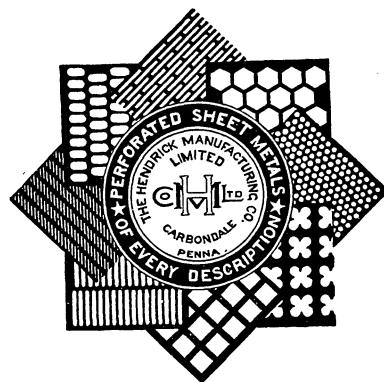
114 & 116 South 4th St., St. Louis, Mo.

THE VAN DORN IRON WORKS CO., Cleveland, Ohio.



Office and Salesroom, 157½ Euclid Ave.,
 MANUFACTURERS OF
WROUGHT IRON FENCE and RAILING.
 Stable Fixtures, Crestings, Terminals, Wire Office and
 Counter Railing, Lawn Seats and Vases.
 Iron and Steel Jail Cell Work. Ornamental and Structural Ironwork.

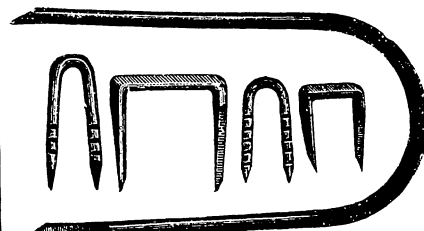
PERFORATED SHEET METALS
 OF EVERY DESCRIPTION.



THE HENDRICK MFG. CO., LTD.
 CARBONDALE, PA.

E. H. Titchener & Co.,
 BINGHAMTON, N. Y.

—MANUFACTURERS OF—



STAPLES in All Varieties,
 Double-Pointed Tacks, Bed Links, Etc.

New York City Agents, HARMON & DIXON,
 118 Chambers Street.

Quick Shipment. Write for Prices.

BARBED
 PLAIN
 CABLE
WIRE
 NAILS
 STAPLES
 STRETCHERS

INDIANA WIRE FENCE CO.,
 Crawfordsville, Ind.

CHAMPION IRON
COMPANY.



The largest Iron Fence and Railing Works in the U. S.
KENTON, OHIO.

SPECIAL
WIRE
TACKS
 and
NAILS.

Particular attention given to
 production of goods adapted to
 special lines of business. Dupli-
 cating samples a specialty.

Taunton Wire Nail Co.,
 Taunton, Mass

CLINTON WIRE CLOTH CO.,

— Manufacturers of Every Description of —

WIRE CLOTH, HEX. NETTINGS, WIRE LATH AND FENCING.

Perforated Metals. GALVANIZERS AND TINNERS OF **Wire Cloth and Nettings.**

Clinton "Standard" (Number 33 Wire) Painted Window Screen Wire Cloth.

FACTORY AND GENERAL OFFICE: CLINTON, MASS.

NEW YORK, 76 Beekman Street.

BOSTON, 199 Washington Street.

CHICAGO, 137 Lake Street.

WRIGHT & COLTON WIRE CLOTH CO., Worcester, Mass.



NEW PROCESS
HARD STEEL WIRE CLOTH AND NETTING
GALVANIZED
WIRE NETTING.
Patented March, 1884.
Patents Pending.

MANUFACTURERS OF EVERY DESCRIPTION OF

Painted Window Screen Wire Cloth,

WIRE LATHING, HOUSE FURNISHING WIRE GOODS.

SEND FOR LATEST CATALOGUE.

OFFICE - 233-235 ARCH. ST.

PENNSYLVANIA GALV'D POULTRY NETTING, -
CORTLAND PAINTED WINDOW SCREEN WIRE -
CLOTH, ADJUSTABLE WINDOW SCREENS, BRASS
AND IRON GRILLES, WROUGHT IRON RAILINGS,
AND WINDOW GUARDS; BRASS, COPPER, STEEL AND
IRON WIRE CLOTH; GALVANIZED WIRE CLOTH.
CORRESPONDENCE SOLICITED.

EDWARD DARBY & SONS. - PENNSYLVANIA

WIRE-WORKS
PHILADELPHIA, PA.

PAINTED AND GALVANIZED WINDOW SCREEN CLOTH.

IRON, STEEL, BRASS AND COPPER WIRE CLOTH.

MANUFACTURERS
**THE ROEBLING
STANDARD
WIRE
LATHING.**

**NEW JERSEY
WIRE CLOTH CO.**

**"JERSEY"
POULTRY
NETTING
AND FARM
FENCING.**

TRENTON, 117 and 119 LIBERTY STREET,
NEW JERSEY.

NEW YORK.

171 and 173 LAKE STREET,
CHICAGO.

25 and 27 FREMONT STREET,
SAN FRANCISCO.

THE WILLIAMS PRINTING CO.,
Commercial Printers and Binders

ESTIMATES FURNISHED FOR ALL CLASSES OF WORK.

96, 98, 100 & 102 READE ST.,

NEW YORK.

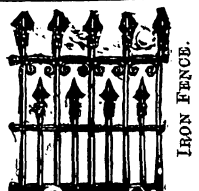
BORDEN & LOVELL,
70 AND 71 WEST STREET,
NEW YORK.

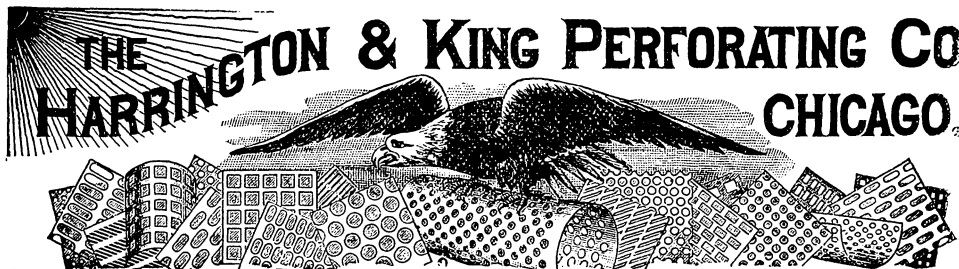
Steel, Iron and Wire Nails.



HIGHEST AWARD REC'D
AT WORLD'S FAIR

— ON —
Wire and Iron Fences,
Bank and Office Railing,
Station Houses or Jail Cells,
Lawn Vases, Cheese Safes.
ILLUSTRATED CATALOGUE FREE.
E. T. BARNUM, DETROIT,
MICHIGAN.



Perforated Filter
Press Plates.BRONZE SCREEN PLATES
To withstand action of
ACIDULATED WATERS.

PERFORATORS OF STEEL, IRON, COPPER, ZINC, BRASS AND TIN.

GRAIN CLEANING AND MINING MACHINERY,
WOOLEN, COTTON, PAPER AND PULP MILLS,
RICE, FLOUR AND COTTON SEED OIL MILLS,
SUGAR AND MALT HOUSES,
DISTILLERIES, FILTER PRESSES,FOR USE IN
STONE, COAL AND ORE SCREENS,
BRICK AND TILE WORKS, FILTERS,
SPARK ARRESTERS, GAS AND WATER WORKS,
OIL, GAS AND VAPOR STOVES,
COFFEE MACHINERY, ETC., ETC.

STANDARD SIZES PERFORATED TIN AND BRASS ALWAYS IN STOCK.

Main Office and Works, 222 to 240 N. Union St., Chicago, Ill., U. S. A. Eastern Office, No. 284 Pearl St., New York.

HAVE YOU DISCOVERED IT?

YOU WILL FIND [MEASURE IT YOURSELF]

POULTRY NETTING

MADE OF WIRE

Galvanized Before Weaving

FROM 1 1-2 TO 4 INCHES

NARROWER THAN IT IS SOLD.

IT IS ALSO OTHERWISE INFERIOR.

AS HERETOFORE, IF YOU ORDER STANDARD

"G. & B." POULTRY NETTING YOU WILL OBTAIN
Full Width, Length, Standard Mesh, Maximum Durability and Strength. It is
beyond the Experimental period, and is made by the oldest
and leading manufacturers in the business.

The Gilbert & Bennett Mfg. Co.

—MANUFACTURE—

WIRE CLOTH, NETTING,

Fencing, Gates, Fencing Tools,

Wire Goods, Wire Work

RAILINGS, WINDOW GUARDS.

WIRE LATHING WITH HAMMOND'S METAL FURRING.

44 Cliff Street,
NEW YORK.148 Lake Street,
CHICAGO.Factories, { GEORGETOWN, CONN.
CHICAGO, ILLINOIS.

ESTABLISHED 1818.

Pearl Window Screen Wire Cloth.
Galvanized Steel Wire Cloth.
Galvanized Wire Poultry Netting.
"Cottage" Lawn & Garden Fencing.
The World's Web Wire Fencing.
Sieves, Riddles, Screens.
Gilbert's Rival Ash Sifters.
House Furnishing Wire Goods



HERCULES WIRE, Pat'd.



Absolutely the best general purpose Fence Wire on the market to-day. Write for prices.
CLEVELAND FENCE CO., 21 Biddle St., INDIANAPOLIS, IND.

Electric Motor Construction for Amateurs.

By C. D. PARKHURST.

Gives directions and working drawings
for making an electric motor to run sew-
ing machines, small lathes, etc., with
rules for constructing the battery to fur-
nish the electrical current, and much
practical relative information.

A table indicating the difference in
wire gauges is included.

Price, \$1.00.

Sent, post-paid, on receipt of price by

DAVID WILLIAMS, Publisher & Bookseller,

96-102 Reade Street, New York.

ATLAS TACK CORPORATION.**508 SEARS BUILDING, BOSTON, MASS., U. S. A.**

BRANCHES: { **DUNBAR, HOBART & CO., WHITMAN, MASS.**
ESTABLISHED IN 1810.
A. FIELD & SONS, TAUNTON, MASS.
ESTABLISHED IN 1827.
AMERICAN TACK CO., FAIRHAVEN, MASS.
ESTABLISHED IN 1867.

LORING & PARKS, PLYMOUTH, MASS.
ESTABLISHED IN 1842.
TAUNTON TACK CO., TAUNTON, MASS.
ESTABLISHED IN 1854.
OLD COLONY RIVET CO., PLYMOUTH, MASS.
ESTABLISHED IN 1866.

MANUFACTURERS OF

Tacks, Brads, Small Nails, Shoe Nails, Lining and Saddle Nails, Tufting Nails and Buttons, Wire Nails, Finishing Nails, Patent Brads, Hungarian Nails, Steel Shanks for Boots and Shoes, Wire Tacks, Esoutcheon Pins, Eyelets, Glaziers' Points, Rivets, Burrs, Furniture Springs, Pilgrim Spring Bed, and other articles.

We have the largest and only complete and fully assorted stock in the world. Our manufacturing facilities are unequalled. The foregoing well known brands we continue to use, and either will be furnished upon request. We have long distance telephone connection with our New York Store and our factories.

MAIN OFFICE, 508 SEARS BUILDING, 199 WASHINGTON ST., BOSTON, MASS.

BRANCH OFFICE & WAREHOUSE, 81 WARREN ST., NEW YORK.

BRANCH OFFICE & WAREHOUSE, 239 & 241 LAKE ST., CHICAGO, ILL.

BRANCH OFFICE & WAREHOUSE, 408 MARKET ST., SAN FRANCISCO, CAL.

BRANCH OFFICE & WAREHOUSE, 406 COMMERCE ST., PHILADELPHIA, PA.

BRANCH OFFICE & WAREHOUSE, 14 WEST GERMAN ST., BALTIMORE, MD.

Tacks, Wire Nails and Brads, Hoop Nails, Staples, Silver and Japanned Lining and Saddle Nails, Double Pointed Tacks, Slating and Roofing Nails.

BONNIE BLUE TACKS.
100 Kegs in a Box,
Assorted 3 to 12 oz.
Retail 2 Kegs for 5
cents.

PARISIAN GILT NAILS.
20 papers in Car-
ton. 5 cent seller.

MONARCH WOOD KEG CARPET TACKS.
5 cent seller.

"JUST ENOUGH"
Brass Nails. 100
Nails in a Paper, just
enough to top a pair
of shoes; 20 papers in
Carton. 5 cent seller.

DOUBLE ENOUGH
Cobblers' Nails. 200
Nails in a Paper, 20
Papers in Carton. 5
cent seller.

BILL NYE BRAD BOX.

168 Papers Wire Brads, assorted 1/8 to 2 in. Each Paper just right to retail for 5 cents.

QUARTER SIZE CUT OF



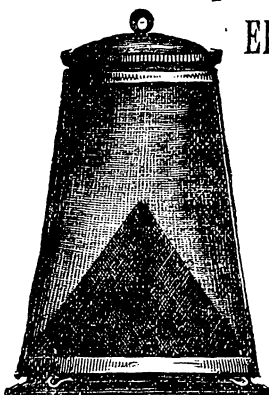
GRAND CROSSING, CHICAGO, ILL. U.S.A.

The New York Iron Roofing and Corrugating Co.

Finest and Largest Variety of Sheet Metals. Products manufactured in the U.S. **FIRST & WASHINGTON STS. JERSEY CITY, N.J.**

THE "Paragon"

Increases in sales
Every year. **Why?** Because they are

**ENDORSED**

by every
purchaser.

**WRITE
THE**

**Bromwell
Brush & Wire
Goods Co.,**

Cincinnati, - - Ohio.

VENTILATION.

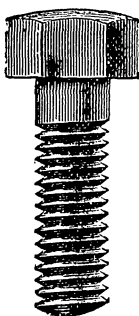
A Text-Book to the practice of the art of ventilating buildings. With a supplementary chapter upon Air Testing by Wm. PATON BUCHAN, R. P. 175 illustrations, 226 pages, price \$1.40. Sent, post-paid, on receipt of price by

DAVID WILLIAMS, Publisher & Bookseller,

96-102 Reade St., New York

REYNOLDS & CO.

MANUFACTURERS OF

**SET, CAP AND MACHINE SCREWS,**

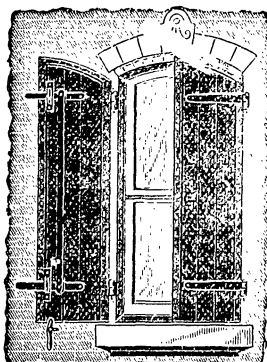
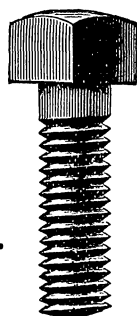
Studs, Coupling Bolts, Stove Bolts, Finished Nuts, &c.



Also Hand and Draw-plate Moulding Machines for Foundry Use.

NEW HAVEN, CONN.

SEND FOR CATALOGUE.



Mention The Iron Age.

PROTECT

Your Offices, Stores and Warehouses from fire and burglars by using

Metallic Doors and Shutters

Made from wood and covered with iron or steel, rendering them stiff and preventing warping in case of fire.
Made from heavy boiler plate iron.
Made from double corrugated iron or steel.
Made to fit any size opening.

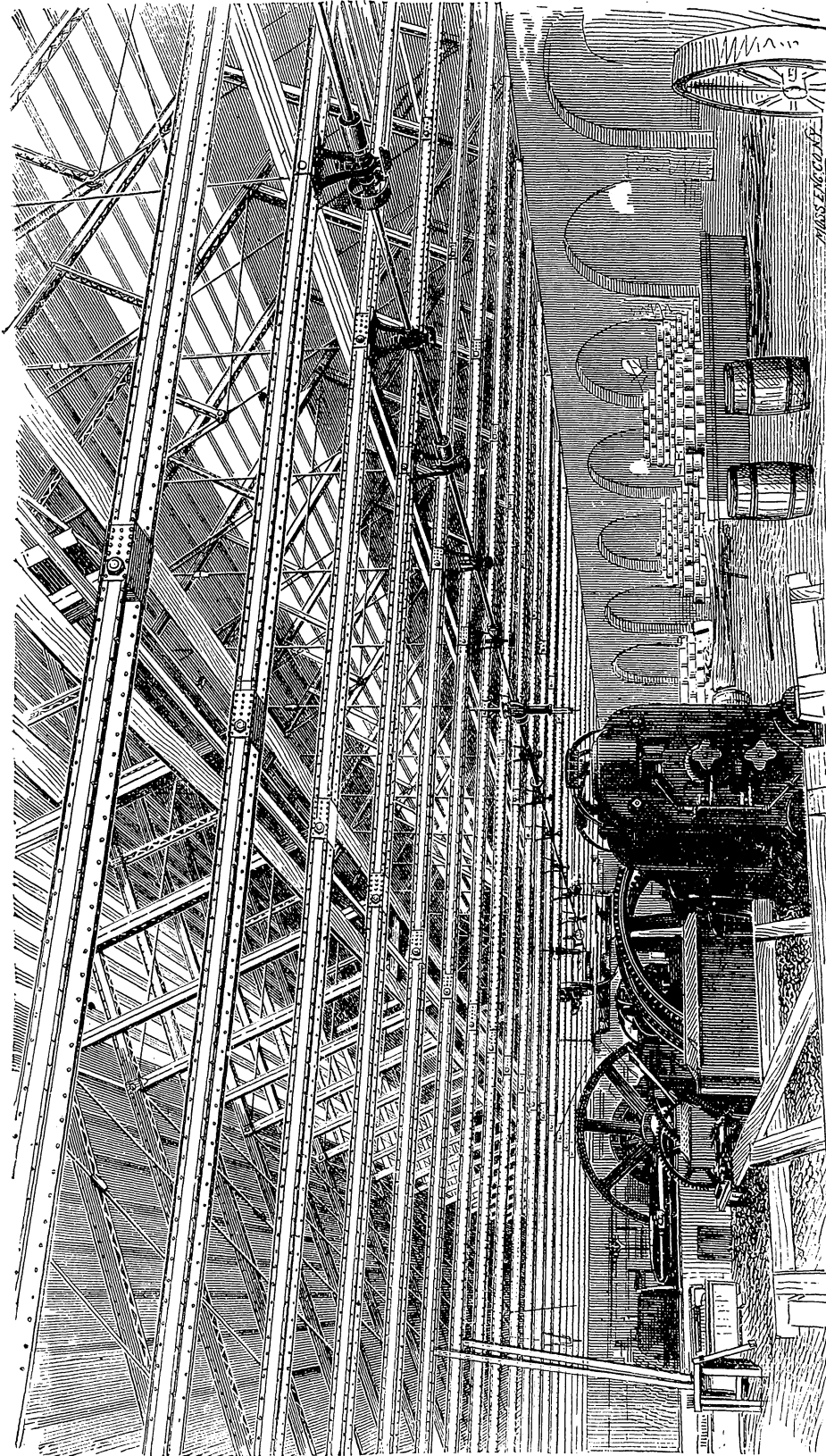
Estimates furnished upon application.

GARRY IRON & STEEL ROOFING CO., CLEVELAND, OHIO.

The Berlin Iron Bridge Co.,

Engineers, Architects and Builders in Iron and Steel.

Office and Works, East Berlin, Conn.



The above illustration is taken direct from a photograph, and shows the construction of an Iron Truss Roof designed and built by us for The Coe Brass Mfg. Co., at Torrington, Conn. The roof is over their

Rolling Mill, which is a building 118 feet in width and 233 feet in length. The line of

brick arches shown on the right connects an adjoining Muffle Room, which is

also covered with an iron truss roof, designed and built by us.

SEND FOR ILLUSTRATED CATALOGUE.

CHAS. M. JARVIS,
Pres. and Chief Engineer.

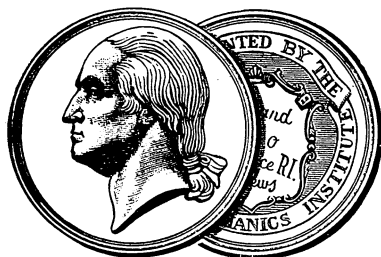
BURR K. FIELD,
Vice-President.

GEO. H. SAGE,
Secretary.

F. L. WILCOX,
Treasurer.



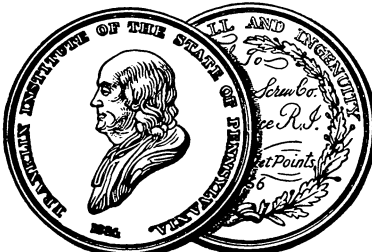
U. S. CENTENNIAL EXHIBITION
1876



METROPOLITAN MECHANICS INSTITUTE



UTICA MECHANICS ASSOCIATION
1856



FRANKLIN INSTITUTE
1856



AMERICAN INSTITUTE
1855



WORLD'S FAIR, N.Y.
1853



AMERICAN INSTITUTE
1841

ESTABLISHED 1838.

American Screw Company,

Providence, Rhode Island,

Has Received an Award at the
**World's Columbian
Exposition**

For Wood AND Machine Screws,
Bolts and Rivets.



AMERICAN INSTITUTE
1891



MASS. CHARITABLE MECHANIC ASS'N
1890



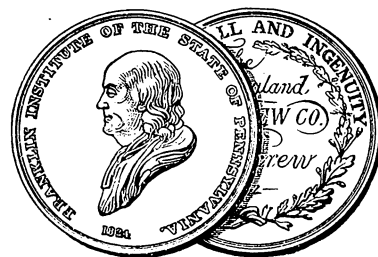
EXPOSITION 'UNIVERSELLE
PARIS, 1889



MIDDLESEX MECHANIC ASSOCIATION
1851



HARTFORD CO. AGRICULTURAL SOCIETY
1842



FRANKLIN INSTITUTE
1842



MASS. CHARITABLE MECHANIC ASS'N
1844



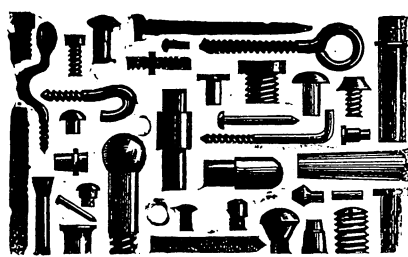
AMERICAN INSTITUTE
1847



WORCESTER CO. MECHANICS ASS'N
1849



MASS. CHARITABLE MECHANIC ASS'N
1850



IRON AND BRASS RIVETS,

STUDS, PINS, SCREWS, &c.,

For Manufacturers of Light Hardware.

BLAKE & JOHNSON, WATERBURY, CONN.

NEW CASTLE WIRE NAIL CO.,

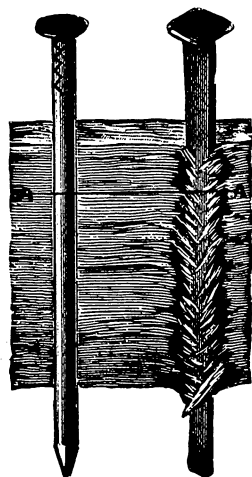
MANUFACTURERS OF



WIRE RODS AND WIRE.

Office and Works,

NEW CASTLE, PA.



THE SALEM WIRE NAIL CO.

MANUFACTURERS

WIRE NAILS,

Works: SALEM, O.; FINDLAY, O.

General Office: - SALEM, OHIO

BRANCH OFFICES:

Room 28, 277 Broadway, New York.

415 Phenix Bldg., Chicago.

200 Amer. Central Bld'g, St. Louis.

19-20 Ainsworth Block, Portland, Ore

88 Pickering Bld'g, Cincinnati, O.

OXFORD

IRON AND NAIL CO.,

Cut Nails

AND

SPIKES.

J. S. SCRANTON, Sales Agent,

81, 88 and 85 Washington Street,
NEW YORK.

PHILLIPS, TOWNSEND & CO.,

North Penn Junction, Philadelphia.

CLENDENIN BROTHERS,

WIRE NAILS, - - -

- - NORWAY RIVETS.

Rivets marked "P" are not of our make. We make only first-class NORWAY IRON RIVETS

THE BOND NAIL.



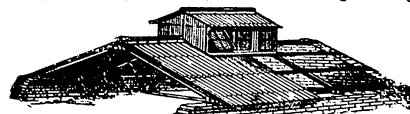
These nails are made from different sizes of wire with head at any desired position between the points. For coopers, box and furniture manufacturers' dowels they are unsurpassed. Builders and repairers of all kinds will find these nails useful. We also manufacture Doweling Machines and Sets for driving these nails.

THE BOND NAIL CO.,

P. O. Box 23,

RAYNHAM, MASS.

Corrugated, Crimped and Clap-Board Iron Roofing & Siding.



Iron Buildings, Roofs, Doors, Shutters, Cornices,
Skylights, Bridges, &c.

MOSELEY IRON BRIDGE AND ROOF CO.,

Office 5 Dey Street, Room 13, NEW YORK.

SHEET
ROD
INGOT

COPPER

WIRE.
NAILS AND
TACKS.
RIVETS AND
BURS.

SEAMLESS BRASS AND COPPER TUBES.

Soldering Coppers

111 South Gay St., - - Baltimore, Md.



Guaranteed
Best Anti-Friction Metal for all machinery bearings.
For high speed and heavy crushing weight it has no equal. It is used on bearings where no other known metal will stand.
Theo. Hiertz & Son, Sole Mfrs.,
30th St. and Park Ave., St. Louis, Mo.
Mfrs. Babbitt Metals, Solder, Lead Car Seals, etc.

Standard Books On METALLURGY.

A Treatise on the Metallurgy of Iron.

Containing outlines of the history of iron manufacture, methods of assay and analyses of iron ores, processes of manufacture of iron and steel, &c. By H. BAUERMAN, F. G. S., associate of the Royal School of Mines. Fifth edition, revised and enlarged. Illustrated with numerous wood engravings from drawings by J. B. JORDAN. 515 pages; cloth. \$2

The Metallurgy of Steel.

Volume I. By HENRY M. HOWE, A.M., S.B. mining and metallurgical engineer; illustrated with many engravings and plates 383 pages; 11 x 14 inches. \$10

Handbook for Charcoal Burners.

Translated from the Swedish of G. Svedelius by PROF. R. B. ANDERSON, and edited with notes by PROF. W. J. L. NICODEMUS, C.E.: 23 wood engravings; 217 pages; cloth. \$1.50

The Metallic Alloys.

A practical guide for the manufacture of all kinds of alloys, amalgams and solders, used by metal workers; together with their chemical and physical properties and their application in the arts and the industries; with an appendix on the coloring of alloys. Translated and edited chiefly from the German of A. KRUPP and ANDREAS WILDBERGER, with extensive additions by Wm. T. BRANNT; illustrated by 16 engravings; 422 pages; cloth. \$3.00

The Metal Worker's Handy Book of Receipts and Processes.

Being a collection of chemical formulas and practical manipulations for the working of all the metals and alloys, including the decoration and beautifying of the articles manufactured therefrom, as well as their preservation. Edited from various sources by WILLIAM T. BRANNT. 530 pages; cloth. \$2.50

Electro-Plating.

A practical hand-book on the deposition of copper, silver, nickel, gold, aluminum, brass, platinum, &c. With descriptions of the chemicals, materials, batteries and dynamic machines used in the art. Second edition: carefully revised, with additions. By J. W. URQUHART; 220 pages; cloth. \$2

Steel and Iron.

Comprising the practice and theory of the several methods pursued in their manufacture, and of their treatment in the rolling mills, the forge and the foundry. By WILLIAM HENRY GREENWOOD, F.C.S. With 97 diagrams; 536 pages; cloth. \$2

An Introduction to the Study of Metallurgy.

By W. C. ROBERTS-AUSTEN, C. B., F. R. S., Associate of the Royal School of Mines, Chemist and Assayer of the Royal Mint. Professor of Metallurgy in the Royal College of Science, with which the Royal School of Mines is incorporated. CONTENTS: Physical properties of metals; alloys; the thermal treatment of metals; fuel; materials and products of metallurgical processes; furnaces; means of supplying air to furnaces; typical metallurgical processes; economic considerations. With numerous diagrams, 292 pages, cloth. \$2.50

Sent, postpaid, on receipt of price, by

DAVID WILLIAMS,

Publisher and Bookseller.

96-102 Reade St., New York.

Gautier Steel Department of Cambria Iron Co.,

JOHNSTOWN, PA.

—: MANUFACTURERS OF:—

MERCHANT BAR STEEL:

Including Tire, Toe Calk, Machinery, Carriage Spring, Railroad Spring, Hoe, Rake, Fork, etc.

AGRICULTURAL STEEL AND SHAPES:

Finger Bars, Knife Backs, Rake Teeth, Bundle Carrier Teeth, Tedder Forks and Springs, Spring Harrow Teeth, Harrow (Drag) Teeth, Seat Springs, etc.

PLOW STEEL:

Flat and Finished Plow Shapes, Digger Blades, Slabs, (Penn and Pernot), Hammered Lay, Rolled Lay, etc.

COLD ROLLED STEEL SHAFTING.

STEEL HARROW DISCS.

CAMBRIA LINK BARB WIRE.

New York Office,
102 Chambers St.

Philadelphia Office,
S. W. Cor. 5th & Commerce Sts.

Chicago Office,
209 Phenix Building.

Southern Office,
Chattanooga, Tenn.

The Cincinnati Corrugating Co.,

We are the largest manufacturers of Iron and Steel Roofing in the country, and are prepared to ship on short notice, and at the lowest prices. We want enterprising agents of good standing, in each county, and solicit correspondence.

Our little book, "The Life of an Iron Roof, or how long will it last," sent free.

Send for Illustrated Catalogue.

Office and Works, Piqua, O.

H.W. JOHNS' ASBESTOS LIQUID PAINTS

SEND FOR SAMPLE CARD AND DESCRIPTIVE PRICE LIST.

H. W. JOHNS MANUFACTURING CO.,
Sole Manufacturers of H. W. Johns' Asbestos Roofing, Sheathing, Building Felt, Asbestos Steam Packings, Boiler Coverings, Roof Paints, Fire Proof-Paints, etc.

VULCABESTON Moulded Piston-Rod Packing Rings, Gaskets, Sheet Packing, etc.

Established 1858.

87 MAIDEN LANE, NEW YORK.

PHILADELPHIA, CHICAGO,
BOSTON, LONDON.

STEEL ROOFING
CORRUGATED IRON EAVE TROUGH
CONDUCTOR PIPE ROOF PAINTS ETC.
CORRESPONDENCE
SOLICITED THE CAMBRIDGE ROOFING CO. CAMBRIDGE, OHIO.

Lukens Iron and Steel Co. INCORPORATED 1890.

The First to make Boiler Plates in America.

Chas. Huston, Pres. A. F. Huston, Vice-Prest. O. L. Huston, Genl. Mgr. Robt. B. Haines, Jr., Secy. Jos. Humpton, Treas.

STEEL AND IRON PLATES, ALSO SHEETS

TO EXTREME DIMENSIONS.

WIDTHS UP TO 10 FEET.

THICKNESS, No. 12 GAUGE TO 1 1/4 INCHES.

—ESTABLISHED 1810.—

WORKS:

NEW YORK OFFICE:

PHILADELPHIA OFFICE:

Coatesville, Pa.

No. 29 Broadway.

62 & 64 Bullitt Bldg.

FRANK SAMUEL,
136-138 So. 4th St.,
Philadelphia.

LOW PHOSPHORUS

PIG IRON—'.08 or under.
SCRAP—'.08 or '.05 or under.
ORE—For O. H. and Furnace Use.
MELTING BAR—
Open Hearth and Bessemer Billets,
Skelp, Muck Bars and Scrap, Foundry
dry and Bessemer Pig Iron.
Syracuse Tube Co.'s Tubes and Pipe.

THE PHOENIX IRON CO., 410 Walnut St., Philadelphia,

MANUFACTURE ALL THEIR PRODUCTS BOTH IN

WROUGHT IRON AND OPEN HEARTH STEEL.

Beams. Channels, Deck Beams, Angles, Tee-bars, Zee-bars and other shapes, Round, Flat and Square BARS of all sizes, Especially adapted for Bridge and Ship Builders, Fire-proof Buildings, Shafting and all Structural Purposes.

SPECIALTIES, in Wrought Iron or Steel:—Phoenix Columns and Upset Eye-Bars of all sizes, Roof Trusses, Girders, Joists and Built-up Shapes of every description.

AGENTS:—EDWARD CORNING & CO., 29 Broadway, NEW YORK; EDWARD CORNING & CO., 70 Kilby St., BOSTON, MASS; JAMES B. STOKES, 132 Market St., SAN FRANCISCO. WESTERN OFFICE: A. C. STITES, 931 The Rookery, CHICAGO.

POTTSVILLE IRON AND STEEL CO., POTTSVILLE, PA,

PHILADELPHIA OFFICE, 226 SOUTH 4th STREET

MANUFACTURERS OF ALL KINDS OF

STRUCTURAL IRON AND STEEL,

Viz., I Beams, Deck Beams, Channels, Tees, Angles, Plates and Bars; and also Open Hearth Steel Billets, Blooms and Slabs.

BREWERY, MALT AND ICE HOUSE CONSTRUCTION A SPECIALTY.

Designers and Constructors of Roofs, Trusses, Columns, &c.

TESTED CHAINS.

BRADLEE & CO., - EMPIRE CHAIN WORKS,

Beach and Otis Streets, PHILADELPHIA.

Chains for Foundry Cranes and Slings, "D. B. G." Special Crane Chain. Steel and Iron Dredging, Slope and Mining Chains. Ship's Cables and Marine Railway Chains.

S. T. WELLMAN, President.
S. H. CHAUVENET, Vice-President.

J. H. ROOP, Treasurer.
RICHARD PETERS, Jr., Secretary.

C. H. WELLMAN, Superintendent.
RICHARD PETERS, Jr., Secretary.

WELLMAN IRON AND STEEL CO

—MANUFACTURERS OF—

Highest Grade Open Hearth Low Phosphorus Steel Fire Box and Boiler Plate. Bessemer Steel Ship and Tank Plate. Open Hearth and Bessemer Blooms and Slabs.

Low Phosphorus Pig Iron.

—PLATES UP TO 126 INCHES IN WIDTH.—

General Office and Works, Thurlow, Delaware County, Pa.

Chicago, Ills., No. 656 "The Rookery."
E. W. CRAMER, Agent.

New York, N. Y., No. 7 Nassau Street,
J. H. BELCHER, Agent.

BARCLAY W. COTTON & CO.,

Successors to ESHERICK, COTTON & CO.,

Iron and Steel Merchants.

AGENTS FOR

AMERICAN WIRE GLASS MFG. CO.

418 Walnut St., PHILA.

MIFFLIN WHEELER.

G. W. NICOLLS.

Nicolls, Wheeler & Co.,

FORMERLY

SITES, WHEELER & CO.,

216 South Third St., Philadelphia, Pa

—DEALERS IN—

IRON AND STEEL SCRAP.

Pig Iron, Muck Bars, Charcoal Blooms, &c., &c.,
Steel and Iron Plates, New and Old Rails.

EDWARD CORNING & CO.,

MANUFACTURERS' AGENTS AND COMMISSION MERCHANTS.

BEAMS, CHANNELS,
ANGLES, TEES, PLATES,
RIVETED GIRDERS.

IRON AND STEEL,

BARS, BANDS, HOOPS,
BOLTS, NUTS, RIVETS,
ROOF TRUSSES.

29 BROADWAY,
NEW YORK.

421 CHESTNUT ST.,
PHILADELPHIA.

70 KILBY ST.,
BOSTON.

OUR OFFICES AND MILLS ARE CONNECTED BY TELEPHONES.

EDWARD J. ETTING,
IRON BROKER & COMMISSION MERCHANT
 222 S. THIRD ST., PHILADELPHIA, PA.
 Pig, Bar and Railroad Iron, Old Rails, Scrap.
 AGENT FOR THE
MOUNT SAVAGE FIRE BRICK,
 Eastern Penna., West New Jersey and Delaware.
Agent TRENTON IRON CO.
 For the Sale of Wire and Wire Rope.
 Longdale (Va.) and other Pig Irons.
 STORAGE YARD, Pier No. 57 South (old Navy Yard)
 which is connected with Penn. R. R. and its various
 connections. Negotiable Warehouse Receipts issued.
 CASH ADVANCES MADE ON IRON.

ESTABLISHED 1869.
JEROME KEELEY & CO.,
 The Philadelphia Bank Bldg., 421 Chestnut St.,
 PHILADELPHIA.

Foundry & Forge Pig Irons,
Iron Ores, Coke, Coal,
Steel Blooms, Billets, Rails, etc.
Muck Bars, Blooms, Scrap Iron.
 Consulting Engineers in Metallurgy and Mining.

JUSTICE COX, JR.,
 218 South 4th St., Phila., Pa
IRON and STEEL.
 — AGENT FOR —

Haldeman, Grubb & Co's.
 Chickies Bessemer Pig Iron.
 Mahoning Rolling Mill Co's
 Best Quality Skelp Iron and Steel.
 Pulaski Iron Co's
 High Grade Foundry and Forge Pig Iron.
 Hainsworth-Steel Co's
 Standard Bessemer Steel Billets.
 Bars, Angles, Sheets, Tank and Bridge
 Plates, Muck Bars, Blooms, Scrap Iron
 and Tool Steel.

J. W. HOFFMAN & CO.,
 Bullitt Building, 135 So. 4th St., Philad'a,
Iron and Steel Merchants.
PIG IRON,
 Iron and Steel Plates, Sheets, Bars and Shapes. Rails.
 Cars and Locomotives. Track Equipment.
 CORRESPONDENCE SOLICITED.

JOHN L. HOGAN & CO.,
 IRON COMMISSION MERCHANTS,
 Bullitt Building, 135 South Fourth St., Phila.
Agents for Brier Hill, Lehigh, Struthers
AND MUIRKIRK PIG IRON,
 Delaware Rolling Mill, muck bars. Youngstown Steel
 Co., Connellsville Coke.

W. H. THOMSON & CO.,
 Dealers in
IRON and STEEL and
other METALS
FOR ALL PURPOSES,
 Room 259, Bullitt Building,
PHILADELPHIA, PA.

B. Houston. J. Max Bernard. H. H. Houston
C. B. HOUSTON & CO.,
 Bullitt Building. **PHILADELPHIA.**

Pig Iron, Coal, Coke, Steel Rails, Structural
Iron, Steel Castings and Fire Brick.
 Sole Agents for **PAXTON ROLLING MILLS.**
STEEL AND IRON PLATES

FRANCIS WISTER
 COMMISSION MERCHANT,
Coke, Coal, Ores.
 PEA AND BUCKWHEAT (Red and White Ash).
 National Foundry Coke a Specialty. Sulphur less
 than 0.5.
 All Sizes National Crushed Coke.
 420 Walnut Street, **PHILADELPHIA.**

W. S. PILLING.

T. I. CRANE

PILLING—AND—CRANE.
IRON ORES: Lake Superior, Foreign, Concentrates,
 Magnetic and native Self-fluxing.
PIG IRON: Low Phosphorus, Open-hearth, Bessemer
 and other grades.
STEEL: In Blooms, Slabs and Billets, and scrap.
COKE: For Furnace and Foundry use.
BULLITT BUILDING, 141 S. FOURTH ST., PHILADELPHIA.

ALAN WOOD COMPANY,
 MANUFACTURERS OF
 Patent Planished, Galvanized, Common, Best Refined, Cleaned and Charcoal Bloom,
PLATE & SHEET IRON.
 ALSO LIGHT PLATES AND SHEETS OF STEEL,
 No. 519 Arch Street, Philadelphia, Pa.
 Orders solicited especially for Corrugated, Gasholder, Pan and Elbow, Water Pipe, Smoke Stack.
 Tank and Boat Iron: Last, Stamping, Ferrule, Locomotive Headlight and Jacket Iron.

CUMBERLAND NAIL AND IRON CO.,
 MANUFACTURERS OF
 "Cumberland" Nails & Wrought Iron Pipe,
 43 North Water St., and 44 North Delaware Ave., PHILADELPHIA.

J. J. MOHR,
 Bullitt Building, No. 131 South Fourth St., Philadelphia, Pa.
 —SOLE AGENT FOR—
 Sheridan, Temple, Brooke, Leesport, Mill Creek, Keystone, Mt. Laurel, Logan and Oley FOUN-
 DRY, FORGE, CHARCOAL AND BESSEMER PIG IRON.
 Dealer in Scrap, Old Car Wheels, Muck Bars and Connellsville Coke.

JAMES G. LINDSAY & CO.
 BULLITT BUILDING, 133 South Fourth St., PHILA.
IRON and STEEL STRUCTURAL MATERIAL
 For all purposes. Estimates Furnished for Iron and Steel Structures.

High Grade Tested Chains.
JAMES MCKAY & CO.,
 29TH & LIBERTY STREETS, **PITTSBURGH, PA.**
 Manufacturers of Coil, Crane and Stud Chain. We also manufacture High Grade
 Steel Chain made of Basic Steel and Special Crane Chain made of U. S. Iron.

Cold Drawn Seamless Steel Tubes
 —FOR—
 Locomotives, Fire, Marine and other Boilers, Hydraulic
 Presses, Hollow Spindles, Bicycles, etc., etc.

Ellwood Shafting & Tube Co.,
 Works, Ellwood City, Law. Co., Pa.
 New York Office, No. 277 Broadway, Room 26.

FITZSIMONS & CO.,
 —MANUFACTURERS—
COLD DRAWN SHAFTING IRON STEEL
CLEVELAND, OHIO.

FRANCIS HOBSON, SEAMAN & CO.,

Successors to FRANCIS HOBSON & SON,
DON STEEL WORKS, SHEFFIELD.

Sole Manufacturers of

HOBSON'S "CHOICE" **(XX)** Extra Best and "Warranted Best"
Cast Steels for Tools, etc.

HOBSON'S "CHOICE" Extra Quality Needle Wire.

SEAMAN'S "NELSON" Brand Extra Cast Steel for Turning Hardest Chilled Rolls, &c.
WAREHOUSE, 97 John St., New York. CHAS. HUGILL, Agent.

THOS. FIRTH & SONS, LIMITED, SHEFFIELD.

CRUCIBLE CAST STEEL.

ABBOTT, WHEELOCK & CO., Agents and Importers of
SWEDISH IRON,

85 OLIVER ST., BOSTON.

23 CLIFF ST., NEW YORK.

S. & C. WARDLOW, SHEFFIELD, ENGLAND.

Manufacturers of the Celebrated Cast and Double Shear Steel,

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Razors, Carvers, Butchers' Knives, Files, Band Saws, Clock, Watch
and all other Springs; also Sole Makers of the Special Brand "TOUGH" Cast Steel for Leather Splitting and
Machine Knives of every description, and for Turning and all other Tools, Dies and Punches.

Office and Warehouse, 95 John St., New York.

Frank S. Pilditch, Agent.

GUSTAF LUNDBERG,

Agent for N. M. HOGGLUND'S SONS & CO. of Stockholm.

Swedish and Norway Iron.

Bessemer and Open Hearth Steel.

19 KILBY STREET, BOSTON.

CARLISLE **KAYSER, ELLISON & CO., SHEFFIELD, ENGLAND**
WORKS, Late WILSON HAWKSWORTH, ELLISON & CO.,

(ESTABLISHED 1825.)

CRUCIBLE STEEL AND STEEL WIRE.

WETHERELL BROS., Agents.

31 OLIVER STREET, BOSTON.

93 LIBERTY STREET, NEW YORK.

JONAS & COLVER CONTINENTAL STEEL WORKS, SHEFFIELD, ENGLAND,

MANUFACTURERS OF ALL KINDS OF STEEL.

Tool Steel, Drill Rods, Needle Wire, Hot Rolled Sheet Steel, Cold Rolled Steel for Cor-
set Springs, Band Saws, Clock and Watch Springs and Parts, and all other Purposes.

HERMANN BOKER & CO., 101 & 103 Duane Street,

(Formerly CARL F. BOKER),

Sole Agents and Importers of Steel and Crucible Wire Rods, &c.

JESSOP'S STEEL

MANUFACTURED BY

WM. JESSOP & SONS, L'D.

OF Best Quality,
IN Bars, Sheets and Plates.

Large assortment of sizes in stock at

91 John St. - - - - - NEW YORK,
And other Agencies.

SHEFFIELD,
ENGLAND.

Gold Medal Paris.
1889.

WIRE

DRAWING

WORTLES, PLATES and JEWEL DIES.

DIES

NEWTON & SHIPMAN,

83 John St., - New York.

CAMBRIA STEEL,

Steel Rails, STANDARD AND LIGHT WEIGHTS, Street Rails and Railway Fastenings,
 BESSEMER AND OPEN-HEARTH BLOOMS, BILLETS AND BARS.
 Steel Axles, Steel Angles, Steel Channels, Steel Forgings.
CAMBRIA IRON COMPANY, Office, 218 S. Fourth St., Philadelphia.
 Chicago Office, Phoenix Building.
 (WORKS AT JOHNSTOWN, PA.)

A. & P. ROBERTS & COMPANY,
Pencoyd Iron Works, MANUFACTURERS OF
Wrought Iron and Open Hearth Steel,
OFFICE: 261 S. 4th Street, PHILADELPHIA, Pa.

Pencoyd Bridge & Construction Co.,
DESIGNERS AND MANUFACTURERS OF
 Bridges, Viaducts, Turn Tables, Etc.
WORKS, PENCLOYD, PA.

E. H. Wilson. A. Kaiser. J. B. M. Hiron.
E. H. WILSON & CO.,
 222 and 224 South Third St., Philadelphia
 BROKERS AND DEALERS IN
IRON and STEEL.
 Correspondence solicited.

PIERSON & CO.,
 —DEALERS IN—
IRON and STEEL
 OF EVERY DESCRIPTION,
 29 Broadway, cor. Morris St.,
 NEW YORK.

A. R. WHITNEY & CO.,
 MANUFACTURERS AND DEALERS IN
IRON and STEEL.

AGENCIES:
 CARNEGIE STEEL CO., Limited, Structural
 Material, Steel and Iron Columns, Beams,
 Channels, Shapes and Plates. Steel Beams
 Rolled to 24 inches deep.
 PORTAGE IRON CO., Limited, Merchant Iron,
 Bars, Angles, Hoops and Cotton Ties.
 BROOKLYN WIRE NAIL CO., Steel Wire
 Nails. Export Nails a Specialty.
 RIVERSIDE IRON WORKS, Steel Pipe.
 GLASGOW TUBE WORKS, Boiler Flues.
 AMERICAN WIRE NAIL MACHINES. Over
 900 working satisfactorily in the United
 States, 25 in Europe and 100 in Canada.
 THE SEIDELL & HASTINGS CO., Charcoal-
 Iron Boiler Plates.
 Plans and estimates furnished and contracts
 made for Iron and Steel Structures of every
 description. Please address,
 29 Broadway, New York.
 P. O. Box 33.

NORTH BROTHERS MFG. CO.
Iron and Brass Founders.
Light Castings a Specialty.
 N. W. Cor. 23d and Race Streets,
 PHILADELPHIA.
 Correspondence solicited.

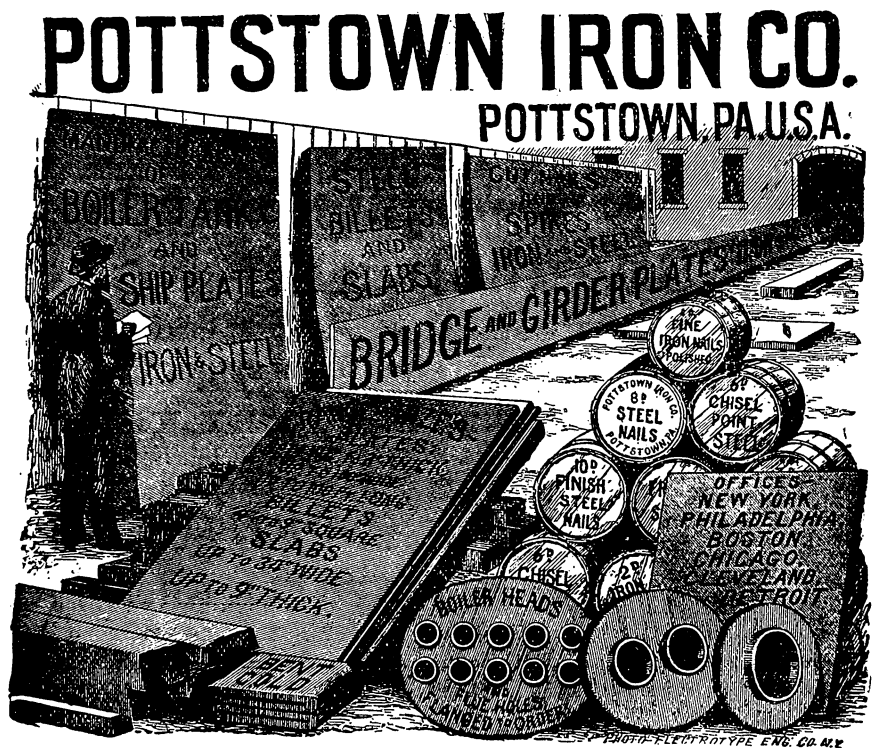
AMERICAN
PIC IRON STORAGE WARRANT CO.,
 (Bank of America Building.) 44 Wall St., N. Y.
 Correspondence of Furnaces Invited.



Hundreds of testimonials showing these castings
 have proved the most satisfactory and economical
 for all purposes requiring strength and durability.

CHROME STEEL WORKS,
 Brooklyn, N. Y.

A. MILNE & CO.,
Swedish (Norway) Iron and Steel,
 BLOOMS, BILLETS, BARS; WIRE, RIVET AND NAIL RODS.
FOREIGN AND DOMESTIC IRON AND STEEL.
 1 Broadway, New York. 8 Oliver Street, Boston.



FRANKFORD STEEL COMPANY.
 FRANKFORD, PHILA., PA.
Steel Railroad and Machine Forgings,
 SOLID CRUCIBLE STEEL CASTINGS
 AND
 Best Grades of Tool and Machinery Steel.



ÆTNA-STANDARD IRON AND STEEL CO.,

Successors to **Ætna Iron and Steel Co., and The Standard Iron Co.,** Manufacturers of
PLATES and SHEETS, BLACK, GALVANIZED and CORRUGATED Plain Roofing, Siding and Ceiling, also of Sheet Steel, for special purposes, Cold Rolled or Plain and Patent Levelled.
BARS, LIGHT SECTION RAILS, ANGLES, TEES and CHANNELS, odd sections and sizes, Machine Straightened Steel Tire, Ordinary Shafting, Horse-Shoe Bars, Ax-Poll Steel, Toe Calk, Nut, Bolt and Chain Rods, and other special Bars suited to every requirement.
PROMPT SHIPMENT from STOCK.
 Inquiries solicited. Stock List Mailed on Application. Address, **BRIDGEPORT, OHIO.**

CARBON STEEL COMPANY, PITTSBURGH, PA.

MANUFACTURERS OF

Universal Mill Plates.
 Sheared Plates and
 Sheets.



Boiler, Ship and Armor
 Plates.
 Also Nickel Steel Plates.

LIST OF SIZES SENT UPON APPLICATION.**AGENCIES:**

L. S. BOOMER, 647 The Rookery, Chicago, Ill. **THE CONDIT-FULLER CO.,** Perry-Payne Building, Cleveland, O.
GEO. KINSEY & CO., 249 West Fourth Street, Cincinnati, O. **JAS. G. LINDSAY & CO.,** Bullitt Building, Philadelphia, Pa.
BULLARD & POST, 125 Milk Street, Boston, Mass. **GEO. C. BEALS,** Erie Co. Savings Bank Building, Buffalo, N. Y.

THE S. OBERMAYER CO.,

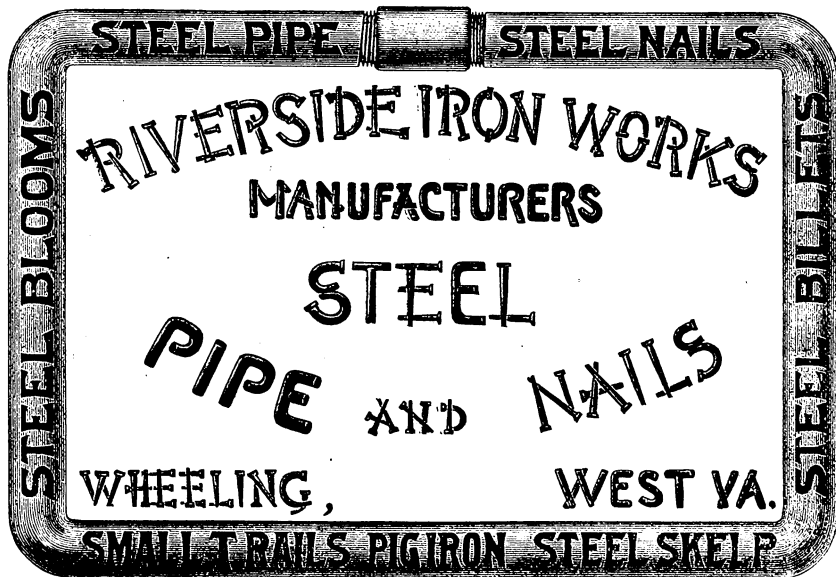
Cincinnati, O., and Chicago, Ills.

—MANUFACTURERS OF—

FOUNDRY FACINGS, SUPPLIES and EQUIPMENTS

—IMPORTERS AND REFINERS OF—

East India Plumbago, Black Lead and Graphite.
 Brass and Iron and Steel Foundries completely equipped.
General Catalogue sent on Application.

**THE IRON FOUNDER.**

A COMPREHENSIVE TREATISE ON

The Art of Molding.

INCLUDING CHAPTERS ON

Core-making; Loam, Dry Sand and Green Sand Molding; also Crystallization, Shrinkage and Contraction of Cast Iron, and a full explanation of the science of Pressures in Molds; added to which are Formulas for Mixtures of Iron, Tables, Rules and Miscellaneous Information.

BY

SIMPSON BOLLAND,

Practical Molder and Manager of Foundries.

Illustrated with Over Three Hundred Engravings.

12mo. Cloth, \$2.50.

"The Iron Founder" Supplement.

A Complete Illustrated Exposition of

**THE ART OF
 CASTING IN IRON,**

COMPRISING THE

Erection and Management of Cupolas, Reverberatory Furnaces, Blowers, Dams, Ladles, Etc.; Mixing Cast Iron; Founding of Chilled Car Wheels; Malleable Iron Castings; Foundry Equipments and Appliances; Gear Molding Machines; Molding Machines; Burning, Chilling, Softening; Annealing; Pouring and Feeding; Foundry Materials; Advanced Molding; Measurement of Castings; Wrought Iron, Steel, Etc.; also the Founding of Statues; the Art of Taking Casts; Pattern Modeling; Useful Formulas and Tables.

—BY—

SIMPSON BOLLAND,

Practical Molder and Manager of
 Foundries; Author of "The Iron
 Founder," etc.

Illustrated with over Two Hundred Engravings.

400 Pages. 12mo, cloth, \$2.50.

Sent, post-paid, on receipt of price by

DAVID WILLIAMS, Publisher & Bookseller,
 96-102 Reade St., New York.

THE CAMBRIDGE IRON & STEEL CO.
 MANUFACTURERS OF
GALVANIZED SHEET IRON
 TRADE MARK
 BLACK SHEETS FOR ROOFING & CORRUGATING
 PICKLED & COLD ROLLED FOR STAMPING
 CAPACITY RANGES FROM NO. 30 26 INCHES WIDE TO 14" x 40" x 120"
 CORRESPONDENCE SOLICITED
 OFFICE & WORKS **CAMBRIDGE, OHIO.**

ESTABLISHED IN 1848.

SINGER, NIMICK & CO., Ltd.

PITTSBURGH, PA.

—MANUFACTURERS OF ALL KINDS OF—

Hammered and Rolled

STEEL.

Warranted Equal to any Produced.

**HIGH GRADE SPECIAL** Crucible Tool Cast Steel, for all purposes requiring the **very finest** quality.**SINGER'S ANNEALED EXTRA** Crucible Tool Cast Steel, for Dies, Cutters, Surgical Instruments, Forceps, and all other purposes requiring an **extra fine** quality.**BEST** Crucible Tool Cast Steel, for all purposes requiring steel of **Standard** quality, such as Turning Tools, Taps, Dies, Drills, Punches, Shear Knives, Cold Chisels, or Edge and Machinists' Tools generally, and for Mining and Quarrying purposes.**SAW STEEL**, for Circular, Mulay, Mill, Gang, Drag, Pit and Cross-Cut Saws.**HOT ROLLED SHEET STEEL**, for Springs, Billet Web and Hand Saws, Nicker Saws, Pocket Knives, Blades and Backs, Drawing and Stamping Cold, &c., &c.**BRIGHT COLD ROLLED SHEET and STRIP STEEL**, for Cold Drawing, Stamping and Bending; for Bells, Cups, Ferrules, Springs, Keys, Chains, Sewing Machine and Type-Writer parts, and to take the place of Sheet Brass, all of unequalled finish and accuracy of gauge.**ROUND MACHINERY STEEL**, for Shafting, Rollers, Spindles, &c., &c.**AGRICULTURAL STEEL.**

"Iron Centre" Cast Plow Steel.
 "Soft Steel Centre" Cast Plow Steel.
 "Soft Steel Back" Cast Plow Steel.
 "Extra Thick Face Centre" Cast Plow Steel.

"Special" (Solid Soft Center) Plow Steel.
 Crucible Cast Plow Steel.
 Steel Rotary Harrow Discs.
 Finished Rolling Plow Colters.
 Agricultural Steel Cut to Pattern.

Also Wagon and Carriage Springs, Axles and Steel Tire.

Represented at **243 Pearl and 18 Cliff Streets, NEW YORK**, by**HOGAN & SON, General Agents for Eastern and New England States.**

GEORGE M. HOGAN, 417 Commerce St., Philadelphia; FITZ, DANA & CO., 110 North St., Boston, and

W. E. STOCKTON, 16 & 18 West Lake St., Chicago.

HUGH RUSSEL, TEMPLE BUILDING, 185 ST. JAMES ST., MONTREAL, CANADA.

LA BELLE STEEL CO.,

Ridge Avenue and Belmont Street, Allegheny City, Pa. Post Office Address, Pittsburgh, Pa.

MANUFACTURERS OF ALL KINDS OF STEEL SPRINGS, AXLES, RAKE TEETH, Etc.**WETHERELL BROS., EASTERN REPRESENTATIVES, 31 Oliver St., Boston, and 93 Liberty St. N.Y.**

RICE, LEWIS & SON, Toronto, Ont.

J. TATNALL LEA & CO.,

No. 125 So. Fourth St., Philadelphia.

**BESSEMER, MILL AND FOUNDRY PIG IRON,
MUCK BARS AND IRON ORES.****W. Dewees Wood Co.,**

MANUFACTURERS OF PATENT

PLANISHED SHEET IRON.**PATENTS:**

Dec. 10th, 1878.	Mar. 4th, 1884.	Aug. 31st, 1886.
Jan. 10th, 1882.	April 16th, 1884.	Jan. 1st, 1889.
Jan. 1st, 1884.	June 10th, 1884.	Jan. 17th, 1893.
Feb. 12th, 1884.	Jan. 6th, 1886.	

Guaranteed fully equal, in all respects, to the Imported Russia Iron.

—ALSO—

Wood's Smooth Finished Sheet Irons and Sheet Steel, Cleaned and Free from Dust.

GENERAL OFFICES AND WORKS

MOKEESPORT, PA.

Branch Office: 111 Water Street, Pittsburgh, Pa.

Screws and Screw Making With a Chapter on the Milling Machine; a complete treatise on Screw Making in all its branches, embracing most recent methods and containing the reports which originated modern standard screw threads. With 95 illustrations. 12mo, cloth.....\$1.25

For Sale by David Williams, 96-102 Rende St., N.Y.

— SOHO IRON & STEELWORKS —

MOORHEAD & McCLEANE CO.
 MANUFACTURERS OF

PLATE IRON & STEEL.

GALVANIZED SHEET IRON

SOHO CHB TRADE MARK

PLATES, SPECIAL WIDE SHEETS AND EXTRA LONG SKELP IRONS

CORRUGATED & ROOFING IRONS

OFFICES AND WORKS, PITTSBURGH.

EASTERN WAREHOUSE. No. 81 JOHN STREET, NEW YORK.

WESTERN WAREHOUSE. Nos. 16 & 18 W. LAKE ST. CHICAGO.

**Stay-Bolt,
Rivet, D. Link,
Axe, Hatchet,
Carriage and
Wagon Axle
IRON.**

Superior Quality Refined Bar Iron

"VULCAN" AND "LOCKHART" BRANDS.



SMALL CHANNELS AND ANGLES,
HEXAGON IRON AND STEEL.

**All
Merchant Bar
Sizes
of
Soft
STEEL.**

THE BETHLEHEM IRON COMPANY.

SOUTH BETHLEHEM, PENNA.

STEEL RAILS, BILLETS AND MUCK BAR, STEEL FORGINGS.

HOLLOW SHAFTING, CRANKS, ROLLS, GUNS AND ARMOR.

Rough, Machined or Finished, Fluid Compressed, Hydraulic Forged.

NEW YORK OFFICE, - - - 80 BROADWAY.
PHILADELPHIA OFFICE, - - - 421 CHESTNUT ST.

PASSAIC ROLLING MILL CO., Paterson, N. J.

—MANUFACTURE—

ROLLED STEEL or IRON BEAMS

Channels, Angles, Tees, Bars, Riveted Work, Forgings, Eye Bars, &c., &c.,

Also OPEN HEARTH STEEL BILLETS and SLABS.

NEW YORK OFFICE, - Rooms 151 and 152, No. 45 Broadway.

THE MONTGOMERY IRON & STEEL COMPANY,

DANVILLE, PA.



PIG IRON, T AND STREET RAILS,

Light Rails, 12 to 40 lbs. per yard.

RAIL JOINTS, SPIKES AND BAR IRON.

R. MUSHET'S "SPECIAL," STEEL "TITANIC,"

FOR LATHE AND PLANER TOOLS.

(The "Trade-Marks" of which are registered in the United States.)

MANUFACTURED ONLY BY

SAMUEL OSBORN & CO., - - - Clyde Steel & Iron Works, Sheffield, Eng.

SOLE REPRESENTATIVES IN THE UNITED STATES,

B. M. JONES & CO., Nos. 11 and 13 Oliver St., Boston.
No. 143 LIBERTY STREET, NEW YORK.

—ESTABLISHED 1850.—

ARCADE MALLEABLE IRON CO.

WARREN McFARLAND & CO.

Malleable Iron and Steel Castings,

WORCESTER, MASS.

Correspondence solicited. Prices given upon receipt of patterns or samples.

GEO. B. BUCKINGHAM.

THE GARTLAND FOUNDRY CO.,

MANUFACTURERS OF

Light Work our
Specialty.

Soft Grey Iron Castings.

We are prepared
to do Japanning and
Galvanizing.UNION and ECHO STS.,
Cleveland, Canton & Southern R. R.,

CLEVELAND, O.

Contracts solicited for

FINE SOFT GREY IRON CASTINGS,

At lowest possible prices.

ALL WORK GUARANTEED.

UNION LOCK & HARDWARE CO., Ltd., Lancaster, Pa.

"CATASAUQUA"

HIGH GRADE

Bars.

CATASAUQUA MFG. CO.

Charles K. Barns & Co., Agents,

224 South Fourth St., PHILADELPHIA.

L. & R. WISTER & CO.,
257 So. 4th St., Philadelphia.

Dunbar Foundry and Forge Irons.

Kemble Pig Iron.

Tuscarawas (Black Band).

Warner & Co's Wash Irons.

Dealers in all kinds of Scrap Iron and Steel.

HENRY LEVIS & CO., Manufacturers' Agents

For Iron and Steel Rails, Car Wheels, Boiler
and Sheet Iron and General
Railway Equipments.Old Rails, Axles and Wheels bought and sold.
284 S. 4th St., Philadelphia.

Manhattan Rolling Mill.

JOHN LEONARD,

446 to 452 West St., New York.

MANUFACTURER OF

HORSE SHOE AND BAR IRON BLACKSMITH SUPPLIES.

OGDEN & WALLACE,

85, 87, 89 & 91 Elm St., New York.

IRON AND STEEL

Of every description kept in stock.

Agents for Park, Brother & Co.'s

BLACK DIAMOND STEEL.

All sizes of Cast and Machinery Steel constantly
on hand.

WILLIAM H. WALLACE & CO., IRON AND STEEL,

10, 12 and 14 ALBANY ST.,
and 131 WASHINGTON ST.,
NEW YORK.

Wm. H. Wallace. Wm. Blsphem. E. C. Wallace.

THE MAHONING VALLEY IRON CO.

—MANUFACTURERS OF—

Bar, Band, Sheet, Plate and Tank Iron,
Angle Iron, Nails, Boat Spikes and Rivets,

YOUNGSTOWN, OHIO.

EXHAUST TUMBLERS,

Hexagon, Round or Wooden

BEST AND CHEAPEST.

WM. A. SWEETSER.

39 Montello St., Brockton, Mass.

BIRMINGHAM IRON FOUNDRY,

BIRMINGHAM, CONN.

**CHILLED ROLLS AND ROLLING
MILL MACHINERY,**McCoy Patent Mill Pinions,
Shears, Rotary Squeezers,**WIRE DRAWING MACHINERY**Special Rolling Machines for Gun Bar-
rels, Hoes, Pick and Axe Polls, Odd
Shapes and Tapers.

ESTABLISHED

1836.

POWDER

—FOR—

Blasting, Mining and Sporting.
ORANGE BRAND.**ELECTRIC BLASTING APPARATUS****SAFETY FUSE, &c.**Send postal card for Illustrated Pamphlet
showing sizes grains Powder, and describing
Blasting Apparatus. Mailed **FREE.****LAFLIN & RAND POWDER CO.,**

New York Office, 29 Murray St.

DYNAMITE,**RED STAR BRAND****For Mining, Quarrying & Stump Blasting**Safety Fuse, Caps, Platinum Fuse, Lead-
ing and Connecting Wire, with every other requi-
site for Blasting Purposes. The especial atten-
tion of the hardware trade is invited to our
line of goods.**NEW YORK POWDER CO.,**

62 Liberty St., New York.

Patent Tumbling Barrels.

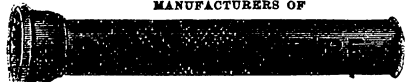
MANY VARIETIES

For all Kinds of Work.

Send for new Catalogue.

HENDERSON BROS., WATERBURY, CONN.**S. CHENEY & SON,
GRAY IRON CASTINGS,****CHEAP HEATING STOVES,****DIAMOND THIMBLES,****MANLIUS, N. Y.****DONALDSON IRON COMPANY,**

MANUFACTURERS OF

**CAST IRON PIPE**And Special Castings for Water and Gas. Also Flange Pipe
Emaus, Lehigh Co., Pa.**FINE GRAY IRON****FRANKLIN IRON FOUNDRY,****The Burr and Houston Company**33-39 Franklin Street, Brooklyn (Green-
point), N. Y.**Special Attention Given to Fine Castings.**

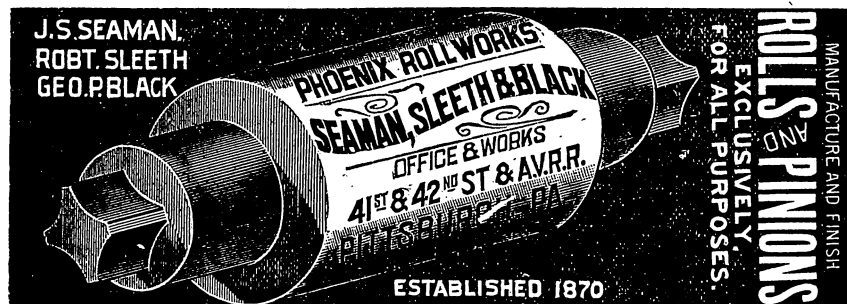
Telephone Call, Greenpoint 174

CHESS BROTHERS,

MANUFACTURERS OF A FULL LINE OF

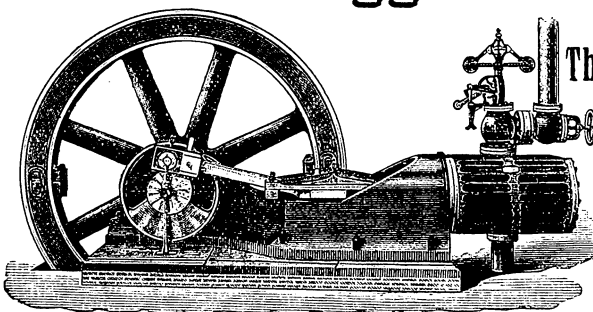
SMALL CUT NAILS, TACKS, SHOE NAILS, ETC.

Always in stock. Special goods made to order.

SOFT STEEL PLATES.Suitable for Implement manufacture and for all Blanking or Stamping uses,
of good surface, rolled carefully to gauges, ranging from No. 6 to 16, inclusive; in
widths up to 15½ inches and to multiples of lengths desired. Finished black or
scaled. And**EXPANDED METAL**In all its varieties of Fire-Proof Lath, Fencing, Tree Guards, &c. Send for catalogues
and prices.**Office, 531 Wood St., PITTSBURGH, PA.****TOTTEN & HOGG I. & S. F'dry Co.,**

Manufacturers of

The "Aetna" Rolling Mill

ENGINEChilled and Sand
Rolls and Rolling Mill
Machinery,**PITTSBURGH, PA.**

GEORGE MESTA, Prest.

W. D. ROWAN, Sec.

J. O. HORNING, Treas.

LEECHBURG FOUNDRY & MACHINE CO.,

Office: LEWIS BLOCK, Pittsburgh, Pa.

Sheet and Bar Mills, Shears, Squeezers and Roll-Lathes**ROLLS. MESTA'S PATENT PICKLING MACHINES AND TIN
PLATE MACHINERY.**

ESTIMATES GIVEN ON COMPLETE TIN PLATE PLANTS.

STANDARD FOUNDRY & MFG. CO., - CLEVELAND, OHIO.

—HEADQUARTERS FOR—

LIGHT GRAY IRON CASTINGS.

—UNEQUALED IN—

SOFTNESS and SUPERIOR FINISH.Our Castings in finishing will save time and tools. We solicit a trial order knowing that we can
please you. Send samples for prices.**WEST'S MOULDERS' TEXT BOOK****BEING PART II. OF AMERICAN FOUNDRY PRACTICE,**Giving the best methods and rules for obtaining good castings, with detailed
description for making moulds. A thoroughly practical book
that should be in the hands of every moulder.**PRICE, - Cloth, - 460 Pages, - - \$2.50.**

SENT, POST-PAID, ON RECEIPT OF PRICE BY

DAVID WILLIAMS, Publisher and Bookseller,

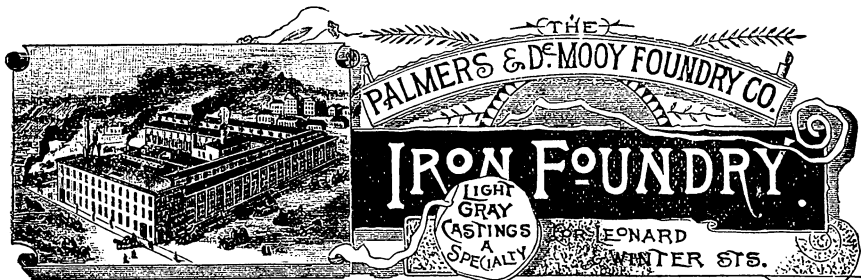
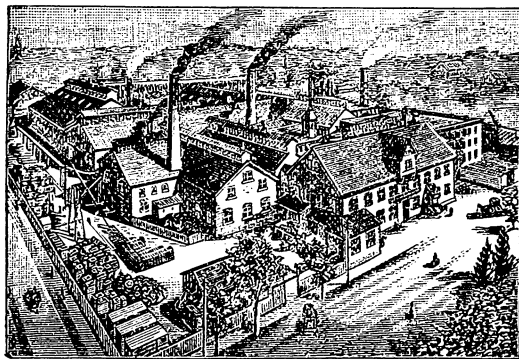
96-102 Reade Street,

New York City.

Sessions Foundry Co., BRISTOL, CONN. IRON CASTINGS TO ORDER.

We make small and large castings of all descriptions, of best quality, and at very low prices.

CORRESPONDENCE SOLICITED.



Soft Castings for Electrical Work and Sewing Machines. Fine Light Gray Iron Castings. **CLEVELAND, O.**
Metal Patterns designed and made. Also Japanning and Galvanizing.

STEEL CASTINGS

FROM 1 to 40,000 POUNDS WEIGHT,
Of Open Hearth, Chester or Bessemer Steel.
True to Pattern. Sound. Solid.
Gearing of all kinds, Crank Shafts, Knuckles for Car Couplers.
Cross-Heads, Rookers, Piston-Heads, etc., for Locomotives.
Steel Castings of Every Description.
Chester Steel Castings Co.
Works, Chester, Pa. Office, 407 Library St., Philadelphia, Pa.

THE ROBINSON-REA MFG. CO.,
PITTSBURGH, PA.

SAND AND CHILLED ROLLS.
TIN PLATE PLANTS COMPLETE.
(No. 5.)

No. 5 PLUMBAGO

East India, Ceylon, German Black or Silver Lead. For foundry use. The finest, purest and positively the best. Samples free.

THE J. D. SMITH FOUNDRY SUPPLY CO., - CINCINNATI, O.

DROP FORGING.

ESTIMATES GIVEN ON APPLICATION.
Sole Manufacturers of Ahlstrom's Patent Parallel Double
EXPANSION BOLTS,
also Single Expansion Bolts. Catalogues mailed on Application.
W. C. BOONE MFG. CO. - Office and Factory, - BOONTON, N. J.

JOHN M. SOLOMON, Successor to **WOOD & CO.**
WILMINGTON, DELAWARE.

Fire Clays for Iron and Steel Furnaces. Furnace Sand for Heating Furnaces. Pits directly on P. W. & B. R. R. Samples on application.

Cranes AND Derricks.

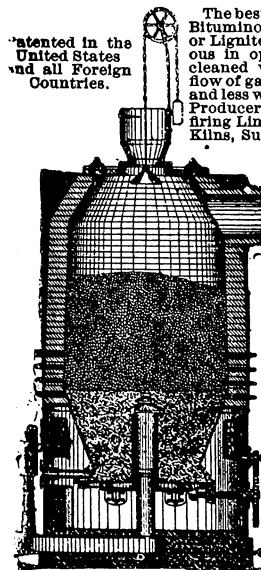
W. S. HALSEY & CO., - Birdsboro, Pa.

R. D. Wood & Co. 400 Chestnut St. **PHILADELPHIA.**

SOLE MAKERS OF THE

TAYLOR REVOLVING-BOTTOM GAS PRODUCER.

Patented in the United States and all Foreign Countries.



The best Producer for either Bituminous or Anthracite coal or Lignite; absolutely continuous in operation, as the fire is cleaned without stopping the flow of gas. Less labor required and less waste than in any other Producer. Producer Gas for firing Lime, Brick and Pottery Kilns, Sugar-house Char Kilns, Boilers, etc.

Also applicable to all Regenerative Furnaces. Send for Pamphlet.

CAST IRON PIPE

MATHEWS' FIRE HYDRANTS
EDDY VALVES,
VALVE
INDICATOR POSTS.

Heavy Loam Castings
Special Machinery.

Water Power Pumps
and
TURBINES.

HYDRAULIC JIB and TRAVELING CRANES,
FREIGHT and CAR LIFTS, Etc.
GAS HOLDERS and GAS MACHINERY.



VADE MECUM.

A work of reference for the use of Architects, Architectural Iron Workers, Builders, Blacksmiths, Bookkeepers, Boiler Makers, Contractors, Civil, Mechanical Hydraulic, Mining, Stationary, Marine and Locomotive Engineers. Foremen of Machine Shops, Firemen, Master Mechanics of Railroads, Master Car Builders, Machine Shop Proprietors, Machinery Jobbers, Machinery Salesmen, Machinists, Pattern Makers, Railway Superintendents, Railway Supply Agents, Roadmasters, Superintendents of Factories and Business Men generally.

Compiled and Arranged by
D. B. DIXON,

And with a most exhaustive Electrical Department by
THOS. G. GRIER,

A Prominent Specialist.

480 Pages, 8 1/4 x 5 1/4 inches, Cloth, \$2.50.

Sent, post-paid, on receipt of price, by

DAVID WILLIAMS,

Publisher and Bookseller,

96 - 102 Reade St., New York

CYRUS BORGNER.
 230 ST. ABOVE RACE PHILADA. PA. U.S.A.
FIRE BRICK
 AND
CLAY RETORTS.

MCLEOD & HENRY CO.
FIRE BRICK
TROY, N.Y.

ESTABLISHED 1856.

HENRY MAURER & SON,
 MANUFACTURERS OF
FIRE BRICK
 of all Shapes and Sizes,
 420 E. 23d St., New York.

B. KREISCHER & SONS,
FIRE BRICK
BEST AND CHEAPEST.
 ESTABLISHED 1845.
 Office, foot of Houston Street, East River, NEW YORK.

ESTABLISHED 1864.
JAMES GARDNER & SON,
 MANUFACTURERS OF
"STANDARD SAVAGE" FIRE BRICK
TILE and FURNACE BLOCKS
 OF ALL SHAPES AND SIZES.
 WORKS, Ellerslie, Allegheny Co., Md.
 OFFICE, Cumberland, Md., P. O. Box 540.

S. M. Hamilton & Co., Agents, - Baltimore, Md.
 Stowe, Fuller & Co., Agents, - Cleveland, O.

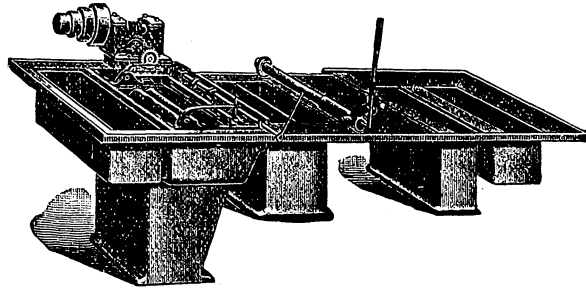
Established 1848.
OSTRANDER FIRE BRICK CO.,
 Manufacturers of
FIRE BRICK
FOR ALL PURPOSES.
TROY, N. Y.

A Trial will
Convince You
 THAT WE MAKE
SOFT AND SMOOTH
Light Gray Iron Castings,
 - - SOUND - -
Brass and Bronze Castings
TRUE TO THE PATTERN.
 Also HAVE FACILITIES FOR FINISHING.
 Sample for estimate solicited.
I. S. SPENCER'S SONS, Guilford, Conn.

M. D. VALENTINE & BRO -
FIRE BRICK
WOODBIDGE, N. J.

THE LLOYD BOOTH CO., **YOUNGSTOWN, OHIO.**

Tinning
MACHINERY.



Rolling Mills,
Sand and Chilli
ROLLS.

GRAY IRON, BRASS, ALUMINUM and ALUMINUM BRONZE CASTINGS
 of the very best quality.
 Very much time saved by using clean and soft castings. We use only the best material. A trial will convince you. **PICKETS and ROSETTES** for Wire Workers. Catalogue of same. **NICKEL PLATING and JAPANNING**, also **METAL PATTERN MAKING** and **LIGHT MACHINE WORK.** We invite correspondence.
HAIGHT & CLARK, - - ALBANY, N. Y.

DROP FORGINGS
Of Every Description, in Iron, Steel, Copper
and Aluminum.

Hoist Hooks, Shafting Collars, Eye Bolts, Wrenches, Machine
Handles, Fence Ornaments.
SPECIAL ATTENTION GIVEN TO THE MANUFACTURE OF
SPECIAL FORGINGS.

PHILADELPHIA DROP FORGE COMPANY,
 Office and Works, S. E. Cor. American and York Sts., Philadelphia.
 New York Agents: **BATT, BONNELL & THOMPSON, 34 Day St., N. Y.**

JOHN H. RICKETSON, Prest. **W. L. RICKETSON, Supt.** **O. G. RICKETSON, Vice-Prest.**
A. G. BARNETT, Treas. **A. G. MCCLINTOCK, Sec'y.**

A. GARRISON FOUNDRY CO.,
 Manufacturers of Sand, Patent Homogeneous Steel and
CHILLED ROLLS.

Ore and Clay Pulverizers, Rotary Squeezers, Haskin's Patent Double Spiral Pinions and Rolling Mill Castings of every description.

Office: Nos. 10 & 12 Wood St., - **PITTSBURGH, PA.**

WESTERN FOUNDRY COMPANY,
LIGHT GRAY IRON CASTINGS.

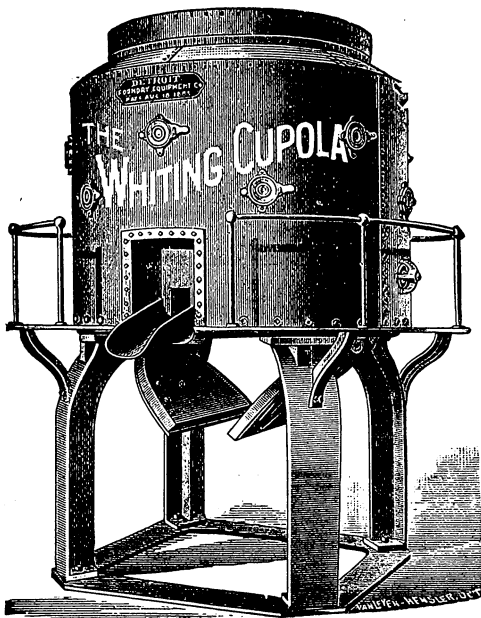
OFFICE: 813 Royal Insurance Building,
Chicago, Ill. Telephone, Main 559.
 WORKS: Albany Ave., near 38th St.
 Telephone, Yards 805.
 Correspondence Solicited. We do Japanning, Galvanizing and Nickel Plating.

Haines Gauge Co.,
 906 Filbert St.,
PHILADELPHIA,
PA., U. S. A.

The HAINES Automatic Micrometer Rolling
MILL GAUGE.
 For reducing HOT WORK in process of rolling

BOOKS

THE NEWEST BOOKS ON Iron, Steel and Metallurgy
 Mining, Mechanical and Civil Engineering; Casting and
 Founding; Electricity and Electric Lighting, promptly
 supplied on receipt of price by
DAVID WILLIAMS, 96-102 Reade St., New York.



THE WHITING PATENT CUPOLA.

Detroit Foundry Equipment Co.,

Designers and Manufacturers.

CRANES,

LADLES, TUMBLERS, TRUCKS, FOUNDRY ELEVATORS, SAND SIFTERS, &C.

COMPLETE FOUNDRY PLANTS.

CHICAGO :

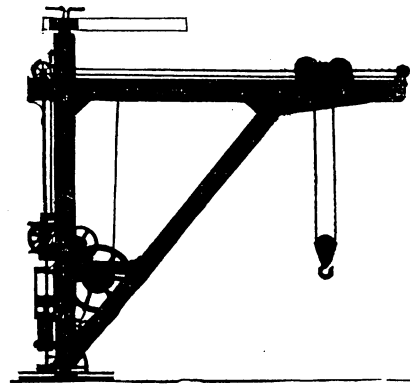
225 Dearborn Street.

DETROIT:

Michigan Avenue & D. & B. C. Ry.

NEW YORK :

182 Front Street.



BOOKS ON MECHANICAL AND STEAM ENGINEERING.

Modern American Locomotive Engines,

their Design, Construction and Management. A practical work for practical men. By EMORY EDWARDS, M. E. Illustrated by 78 engravings; 383 pages; cloth.....\$2

Engineers' Sketch Book.

By THOMAS WALTER BARBER, engineer. Nearly 2000 illustrations, descriptive notes and memoranda; 243 pages; cloth.....\$3

Locomotive Engine Running and Management.

A practical treatise on the locomotive engines, showing their performance in running different kinds of trains with economy and dispatch; also directions regarding the care, management and repairs of locomotives and all their connections. Illustrated by numerous engravings. Seventeenth edition. By ANGUS SINCLAIR, M. E. Cloth.....\$2

Stationary Steam Engines.

Especially adapted to electric lighting purposes. Treating of the development of steam engines—the principles of construction and economy, with description of moderate speed and high speed engines. By Prof. R. H. THURSTON. Fourth edition; 177 pages cloth.....\$1.50

Thermo-Dynamics, Heat Motors, and Refrigerating Machines

By Prof. DE VOLSON WOOD. Third edition, revised and enlarged; 452 pages; cloth....\$4

Mechanics' and Engineers' Pocket Book.

By CHAS. H. HASWELL. Fifty-fifth edition; 956 pages; leather.....\$4

Manager's Hand-Book of Modern Rules,

Tables and Data for Civil and Mechanical Engineers, Millwrights and Boiler Makers, Tool Makers, Machinists and Metal Worker's Iron and Brass Founders, &c. By W. S. HURTON. Thick 8vo, half-bound.....\$6

Valve Gears.

Analysis by Zeuner Diagram. By H. W. SPANGLER, P. A. Engr., U. S. Navy; 160 illustrations; cloth.....\$2.50

The New Catechism of the Locomotive.

Rewritten and enlarged with new matter and illustrations selected from the latest practice in this country. By M. N. FORNEY; 709 pages; cloth....\$3.50

A Treatise on Toothed Gearing,

Containing complete instructions of designing, drawing and constructing spur wheels, bevel wheels, lantern gear, screw gear, worms, &c., and the proper formation of tooth profiles. For the use of machinists, pattern makers, draftsmen, designers scientific schools, &c. With many plates. By J. HOWARD CROMWELL, Ph. B. Third edition; 245 pages; cloth.....\$1.50

Richards' Steam Engine Indicator.

A treatise on the development and application of force in the steam engine. Fourth edition, revised and enlarged. By C. T. PORTER. 273 pages; 20 plates; cloth.....\$3

Complete Practical Machinist.

By JOSHUA ROSE. Embracing lathe work, vise work, drills and drilling, taps and dies, hardening and tempering, the making and use of tools, &c. Fifteenth edition; 356 illustrations; 430 pages.....\$2.50

A Treatise on Belts and Pulleys

Embracing full explanations on fundamental principles, proper disposition of pulleys, rules for determining widths of leather and vulcanized rubber belts and belts running over covered pulleys; strength and proportions of pulleys, drums, &c.; together with the principles and necessary rules for rope gearing and transmission of power by means of metallic cables. By J. HOWARD CROMWELL, Ph. B., author of a Treatise on Toothed Gearing; 271 pages; cloth...\$1.50

Lathe Work.

A practical treatise on the tools, appliances and processes employed in the art of turning, including hand turning, boring and drilling, the use of slide rests and overhead gear, screw cutting by hand and self-acting motion, wheel cutting, &c. By PAUL N. HASLUCK. Fourth edition, revised and enlarged; 212 pages, 51 cuts; cloth.....\$2

Any book published sent, postpaid, on receipt of price by

DAVID WILLIAMS, Publisher and Bookseller, 96-102 Reade St., New York.

Hardened Forged

Steel Rolls.

TRETHERWEY MFG. CO., - 47th ST., PITTSBURGH, PA.

MANUFACTURERS OF

Roll Turning Tools, Solid Steel Shear Knives, Tool Steel Dies of any size, Forgings of Machinery or Tool Steel, Rolling Mill Machinery, Steam Hammers, Squaring Shears, Double Headed Rotary Shears, Shear Grinding Machinery, Circle Cutting Machines, Roll Lathes.

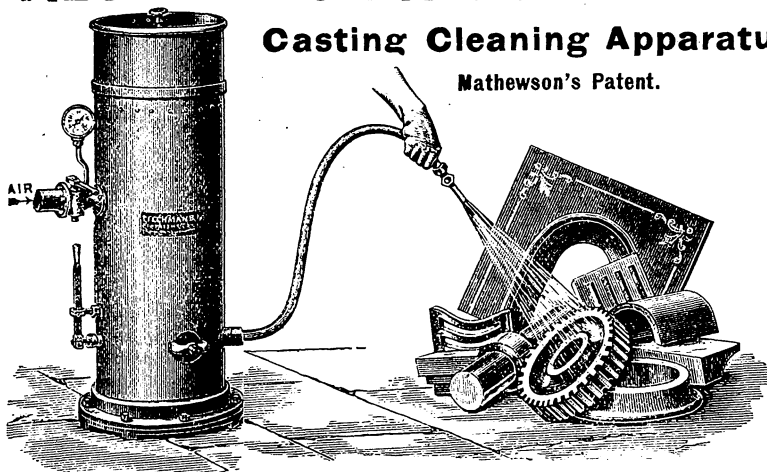
TILCHMAN'S PAT. SAND BLAST COMPANY, LTD.,

Casting Cleaning Apparatus,

SHEFFIELD, ENG.,

Mathewson's Patent.

MANUFACTURERS OF



Patent Sand Blast Apparatus for sharpening and scouring files, cleaning steel, iron and brass castings, forgings, stampings, plates, &c.; also for obscuring, decorating and perforating all descriptions of glass, and cutting inscriptions and other designs on granite, marble and other stones.

ALEX LAUGHLIN & CO.

LEWIS BLOCK, PITTSBURGH, PA.

Gas Heating
Gas Puddling
Open Hearth
Crucible
Tube Welding

FURNACES

AND ARTIFICIAL GAS PRODUCERS OF EVERY DESCRIPTION, for ROLLING MILLS, STEEL AND TUBE WORKS.

We guarantee to place all Plants erected by us in successful operation

M. V. SMITH, PRES.
G. C. MORROW, SEC.

M. A. GREENE, VICE-PRES.
JOHN A. ELLIOTT, TREAS.

Artificial Gas Engineering Co.,

Consulting and Contracting
ENGINEERS.

ARTIFICIAL Gas applied to all Branches of Manufacturing and Domestic Uses. Apparatus for the Manufacture of Coal-Gas Furnished at Lowest Prices

706 TIMES BUILDING,
PITTSBURGH, PA.

HENRY AIKEN,

Consulting Mechanical Engineer,

Rooms 203-206 Lewis Block,
PITTSBURGH, PA.

THE S. R. SMYTHE COMPANY,

LEWIS BLOCK, ENGINEERS AND CONTRACTORS, PITTSBURGH, PA.

Regenerative Gas Furnaces and Gas Producers For All Purposes.

TUBE, STEEL, ROLLING MILLS, GLASS WORKS CONSTRUCTION, Etc.

We contract for complete Plants, guarantee results and operation. OVER 100 PLANTS BUILT AND WORKING.

McAULEY FEED WATER HEATER AND PURIFIER. Clean Boilers Guaranteed at small cost. No scale, better service, and saving in fuel.

JULIAN KENNEDY.

Consulting and Contracting Engineer,

Rooms 36, 37, 38, 39 Vandergrift Building, Pittsburgh, Pa.

Blast Furnaces, Bessemer and Open Hearth Steel Works, Rolling Mills.

STEAM AND HYDRAULIC MACHINERY, &c.

—Branch Office of The Latrobe Steel Works.—

Wm. Swindell & Bros.,

ENGINEERS AND CONTRACTORS,

Regenerative and Recuperative Gas Furnaces for Steel, Iron and Glass.

SWINDELL'S IMPROVED GAS PRODUCERS,

243 BUILT SINCE APRIL 1, 1891.

P. O. Box 945.

548 Smithfield St., Pittsburgh, Pa.



MERRILL BROS., 465 to 471 Kent Ave., Brooklyn, E.D., N. Y.

Pennsylvania Diamond Drill & Manufacturing Co.

BIRDSBORO, PA.

Drill Press and Planer Chucks. Steam and Gas Engines. Diamond Pointed Core Prospecting Drills. Boiler Fronts and General Castings. Mineral Lands Prospected and Artesian Wells Bored by Contract.

CHICAGO MACHINERY & ENGINEERING CO., Western Sales Agents, Chicago.

JAMES HEMPHILL, President.
WM. H. CONLEY, Treasurer.

THOS. B. RITER Vice-President.
JNO. F. WILCOX, Gen'l Manager.

PITTSBURG IRON & STEEL ENGINEERING CO.

LEWIS BLOCK, PITTSBURG, PA., U. S. A.

BESSEMER AND OPEN-HEARTH STEEL PLANTS.

Rolling Mills (Blooming, Rail, Plate, &c). Blast Furnaces, Engines
Boilers, Bridges, Girders, Iron Buildings.

WORKS BUILT COMPLETE and Fully Equipped for Operation.

THE D. R. LEAN COMPANY, Blast Furnace and Steel Plant Construction,

Penn Building, Pittsburgh, Pa.

J. A. HERRICK, M. E.,

Consulting Engineer and Contractor.
Room 609, 284 Pearl Street, NEW YORK.

— STEEL CASTING PLANTS A SPECIALTY. —

Melting and Heating Furnaces of ALL KINDS.

Patent Gas WATER VALVES. Improved "BASIC" and "SEMI-STEEL" Processes and FURNACES.
New CONTINUOUS Gas PRODUCERS.

CORLISS STEAM ENGINES,

TANK and STAND PIPES,

FEED WATER HEATERS,

STEEL PLATE CHIMNEYS,

AIR PUMPS AND CONDENSERS.

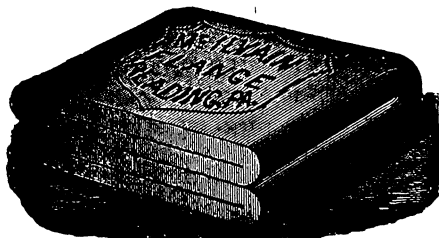
Philadelphia Engineering Works,

LIMITED.

Philadelphia, Pa., U. S. A.

Long Distance Telephone, 1781.

TENSILE } 56,000 to 64,000 lbs.
STRAIN. }



CAPACITY. { Plates 1 inch thick to No. 12.
30 feet long.
70 inches wide.

WM. McILVAIN & SONS,

READING, PA.,

MANUFACTURERS OF

IRON AND STEEL BOILER PLATES.

Locomotive, Fire Box, Flange, Shell,
Tank Iron and Steel, including Plates for
Bridges, Girders, Stacks, Pipe and Fire
and Burglar-proof Safes.

THE ALLENTOWN ROLLING MILLS,

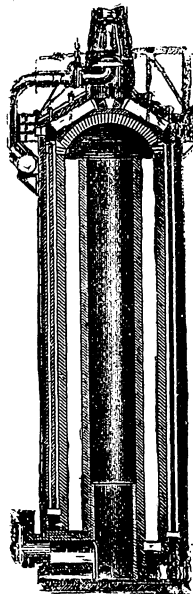
MANUFACTURERS OF

Pig Iron, Merchant Bar Iron, Rolled Shafting, Mine Rails, I-Beams, Tee Bars, Fish
Plates, Bolts, Nuts and Spikes.

Transfer and Locomotive Turn Tables, Blast Furnace, Rolling Mill and Mining Machinery, Mining Pumps, Etc. Roll Trains, Shears, Punches, Iron Trucks, Etc. Builders of all classes of Machinery. Makers of Castings of all descriptions for Cable and Electric Railway.

ALLENTOWN, PA.

McCLURE, AMSLER & CO. Engineers and Contractors



Bissell Block,
PITTSBURGH, PA.

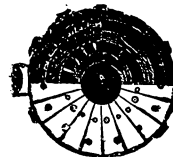
Blast Furnace Construction

A SPECIALTY.

Sole Agents for
MASSICK'S & CROOKE'S
PATENT

Fire Brick Stoves,

Designs and Estimates
for the construction of
Blast Furnace Work,
and for all kinds of Hot
Blast Fire Brick or Pipe
Stoves; and all other kinds
of Brick Work pertaining
to Steel Plants, Iron, Brick
or Wooden Buildings, all
kinds of Iron Construction
in general.



We propose to put into successful operation all the plants we design and contract for.

The Iron-Masters' LABORATORY

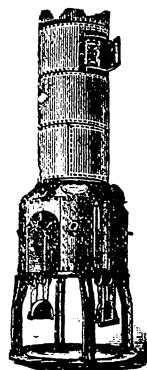
Exclusively for the

Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clays,
Slags and Coal for Practical
Metallurgical Purposes.

Branch Office, 339 Walnut St., Philadelphia.

All Analytical Work at Warrenton, Virginia.
J. BLODGET BRITTON.

This laboratory was established in 1886, at the instance of a number of practical Iron Masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes, the object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.



THE COLLIAU PATENT Cupola Furnace

LEADS ALL OTHERS IN

ECONOMY,
CAPACITY,
DURABILITY.

Correspondence Solicited.

BYRAM & COMPANY,

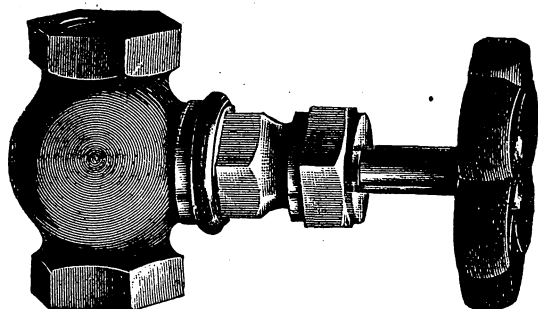
Exclusive Manufacturers,
DETROIT, . . . MICH.

Tips to Inventors. By ROBERT GRIMSHAW, Ph.D., M.E. Telling what inventions are needed and how to perfect and develop new ideas in any line. Cloth.....\$1.00
For sale by David Williams, 96-102 Reade St., N. Y.

**BLAST FURNACES,
ROLLING MILLS,
STEEL WORKS,
MINES, ETC.,
ETC.**



**OIL WELLS,
REFINERIES,
ELECTRIC LIGHT PLANTS
WATER WORKS, ETC.,
ETC.**



McNAB & HARLIN MFG. CO.,
— MANUFACTURERS OF —
BRASS COCKS AND VALVES
For Steam, Water and Gas.

Wrought Iron Pipe and Fittings. Plumbers' Materials. Seamless
Brass and Copper Tubes.

Factory, PATERSON, N. J.

56 JOHN ST., N. Y.

Catalogue and Price-List will be sent to the Trade with their first order, or by express, if desired, before ordering.



THE CONTINENTAL IRON WORKS

West and Calyer Streets, BROOKLYN, N. Y.,

— SOLE MANUFACTURERS OF —

**CORRUGATED FURNACES, FOR MARINE AND
LAND BOILERS.**

Made in sizes from 28 in. to 60 in. diameter, with flanged or plain ends.

Take Ferry from East 10th or 23d Streets, N. Y., to Greenpoint.

Thos. F. Rowland, Pres.
Thos. F. Rowland, Jr., Treas.

Warren E. Hill,
Chas. H. Corbett,

Vice-Pres.

**The Improved
WHARTON - HARRISON
SAFETY BOILER,**

For all Power and Heating Purposes.
Single Boilers 2-240 H.-P.
Batteries of any Capacity.

**THE COCHRANE
FEEDWATER HEATER.**

**THE COCHRANE
FEEDWATER HEATER & PURIFIER.**

**THE COCHRANE
SEPARATOR.**

Horizontal or Vertical Form. For Obtaining
Dry Steam. Purified Exhaust.
FOR PARTICULARS ADDRESS

Harrison Safety Boiler Wks.,
Germantown Junction. PHILADELPHIA, PA.



THE TECHNO-CHEMICAL RECEIPT BOOK

CONTAINING

SEVERAL THOUSAND RECEIPTS, COVERING THE LATEST
MOST IMPORTANT AND MOST USEFUL DISCOVERIES IN
CHEMICAL TECHNOLOGY, AND THEIR PRAC-
TICAL APPLICATION IN THE ARTS
AND THE INDUSTRIES.

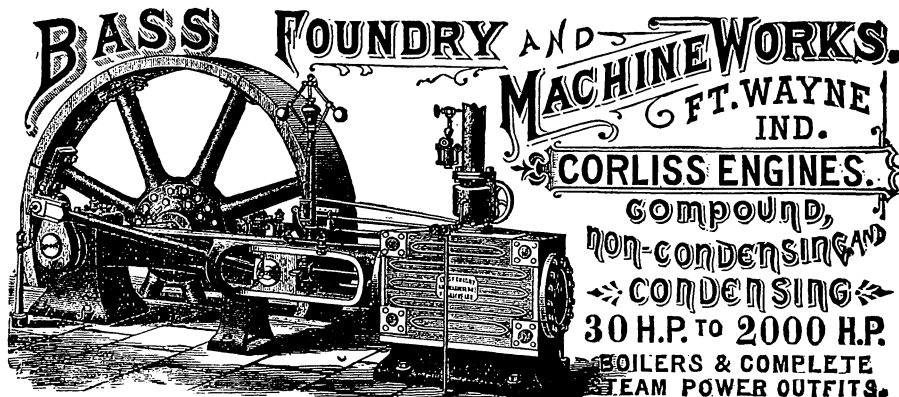
Edited from the German with Additions by

WILLIAM T. BRANNT.

495 Pages, Cloth, \$2.00.

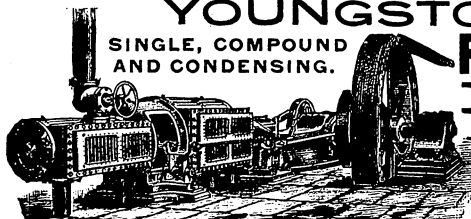
Sent post-paid on receipt of price, by

DAVID WILLIAMS, Publisher & Bookseller,
96-102 Reade St., New York.



WILLIAM TOD & CO.

YOUNGSTOWN, OHIO.



SINGLE, COMPOUND
AND CONDENSING.

**PORTER-HAMILTON
ENGINE**

Blowing Engines,
Hydraulic Cranes & Accumulators
Heavy Special Machinery.
ENGINE CATALOGUE ON APPLICATION.

The Buckeye Engine Co.,

SALEM, OHIO,

Have received Awards at the World's Fair as follows:

One Medal and Diploma and two Special Diplomas on Simple
Engines, Medium and High Speed, Tandem Compound and
Cross Compound Condensing and Triple Expansion Four
Cylinder Condensing Engine.



THOROUGH INSPECTIONS

And Insurance against loss or damage to property and loss of life and injury to persons caused by

Steam Boiler Explosions

J. M. ALLEN, Pres. WM. B. FRANKLIN, Vice-Pres. F. B. ALLEN, 2d Vice-Pres. J. B. PIERCE, Sec. and Treas.

BOARD OF DIRECTORS:

J. M. ALLEN, President.
 FRANK W. CHENEY, of Cheney Brothers Silk Manufacturing Co.
 CHARLES M. BEACH, of Beach & Co.
 DANIEL PHILLIPS, of Adams Express Company.
 RICHARD W. H. JARVIS, President Colt's Fire Arms Manufacturing Co.
 THOMAS O. ENDERS, of the United States Bank.
 LEVERETT BRAINARD, of the Case, Lockwood & Brainard Co.
 GEN. WM. B. FRANKLIN, late Vice-President Colt's Pat. Fire Arms Mfg. Co.
 NELSON HOLLISTER, of the State Bank, Hartford.

HON. HENRY C. ROBINSON, Attorney at Law, Hartford.
 HON. FRANCIS B. COOLEY, of the National Exchange Bank, Hartford, Conn.
 A. W. JILLSON, late Vice-Prest. Phoenix Fire Insurance Co., Hartford, Conn.
 EDMUND A. STEADMAN, President of the Fidelity Co., Hartford, Conn.
 GEORGE BURNHAM, Baldwin Locomotive Works, Philadelphia.
 HON. NATHANIEL SHIPMAN, Judge U. S. Circuit Court.
 C. C. KIMBALL, Prest. Smythe Manufacturing Co., Hartford, Conn.
 PHILIP CORBIN, of P. & F. Corbin, New Britain, Conn.

THE EYNON-EVANS MANUFACTURING CO.,

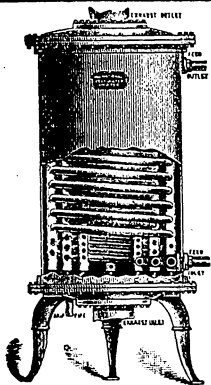
Patentees and
Manufacturers of

THE EYNON-KORTING COMPOUND INJECTORS.

Extra Heavy Globe and Angle Valves.  Brass Castings up to 5000 lbs.

Blowers, Ventilators, Blast Nozzles, Exhausters, Brass Syphons, Acid Syphons, Condensers.

Fifteenth and Clearfield Sts., Philadelphia, Pa.



The National Feed Water Heater

is a BRASS COIL HEATER, delivering water to the boilers at 212° Fahrenheit. It is low in price, but unequalled in efficiency. 500,000 H. P. in daily use attests its merits.

Coils and Bends of Iron, Brass, and Copper Pipe.

THE NATIONAL PIPE BENDING CO.,
 98 River St., New Haven, Conn.



The C. & C. ELECTRIC COMPANY

ARE PREPARED TO FURNISH

MULTIPOLAR DYNAMOS, DIRECT DRIVEN OR BELTED,

IN SIZES UP TO 250 H.-P.

Bipolar Dynamos up to 100 H.-P. Electric Motors, Automatic or Hand Controlled.

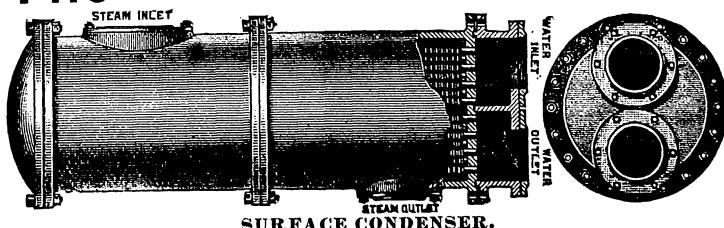
Complete Plants for Power Transmission. Isolated Lighting Plants.

Central Station Apparatus.

General Office, 143 Liberty St., New York. Works, Garwood, N. J., on Central R. R. of N. J.

BRANCH OFFICES: CHICAGO, 201 Madison Street. BOSTON, 63 Oliver Street. CLEVELAND, Cuyahoga Building. PHILADELPHIA, 633 Arch Street.

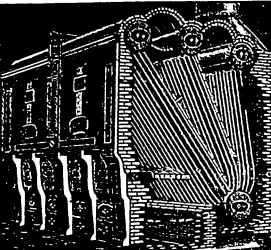
The WAINWRIGHT FEED WATER HEATER



is a straight corrugated copper tube heater, and is making a record which its competitors find hard to beat. Send for the whole story to

THE TAUNTON LOCOMOTIVE MFG. CO.,
 TAUNTON, MASS.

SAFE. EFFICIENT.
ECONOMICAL.
DURABLE.
PRACTICALLY
SELF-CLEANING.
NO CAST METAL.



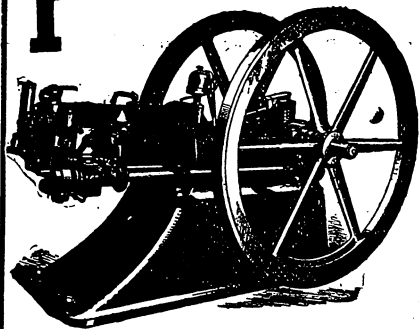
NO FLAT SURFACES.
NO STAY BOLTS.
REMOVAL OF FOUR
MANHOLE PLATES
GIVES ACCESS TO
EVERY PART.

THE STIRLING WATER TUBE SAFETY BOILER.

74 Cortlandt St., New York.
418 Walnut St., Phila.
Cuyahoga Building, Cleveland.

THE STIRLING CO.,
Gen'l Offices, Pullman Building,
CHICAGO, ILL.

POWER FROM GASOLINE.



DIRECT FROM THE TANK.
CHEAPER THAN STEAM. No Boiler. No Steam. No Engineer.
FOR USE EVERYWHERE.
OTTO GASOLINE ENGINES, Stationary or Portable.
1 to 50 H. P. 8 to 20 H. P.

Running Expenses, Less than one cent per horse power per hour. For large engines, one-half cent per horse power per hour. Suitable for all manufacturing purposes, Electric Lighting, Town Water Supply. **The Best Auxillary Power for Night Work.**

OTTO GAS ENGINE WORKS,

33d and Walnut Sts., PHILADELPHIA, PA.

CHICAGO OFFICE: 245 Lake St.

BOSTON OFFICE: 19 Pearl St.

THE AMERICAN FEED WATER HEATER

Received the First Prize at the

Mechanics' Association Fair, - Boston, Mass.

What you get when you buy the AMERICAN HEATERS:

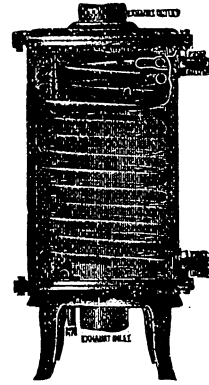
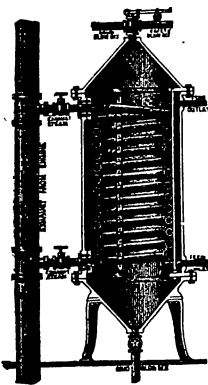
COPPER COILS,
SOLIDLY BRAZED,
GUN METAL FITTINGS
AND CLAMP STAYS,
STEEL SHELLS,

NO RUSTING OUT,
NO LEAKY JOINTS,
NO TROUBLE FROM EXPANSION,
NO BACK PRESSURE,
NO OIL IN BOILER.

We guarantee this Heater to be the Most Durable, Effective and Cheapest

WHITLOCK COIL PIPE CO.,

27 South Street, - - - - - Elmwood, Conn.



CHAPMAN VALVE MFG. CO.

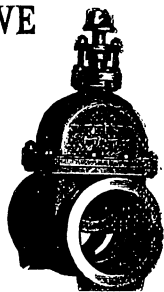
Manufacturers of

VALVES & GATES

For Water, Steam, Gas,
Ammonia, &c.

GATE FIRE HYDRANTS,

With and without independent outlets.



We make a specialty of Valves with Bronze seats for High Pressure steam.

Works and General Office,

INDIAN ORCHARD, MASS.

Treasurer's Office,

72 Kilby and 112 Milk Streets,

Boston, Mass.

Chicago Office, 24 West Lake St. New York Office,
28 Platt Street.

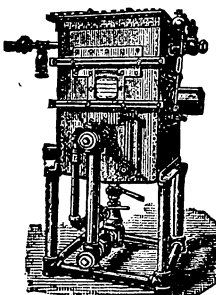
The Metal Worker's Handy-Book OF RECEIPTS AND PROCESSES,

BEING A COLLECTION OF CHEMICAL FORMULAS AND PRACTICAL MANIPULATIONS FOR THE WORKING OF ALL THE METALS AND ALLOYS, INCLUDING THE DECORATION AND BEAUTIFYING OF ARTICLES MANUFACTURED THEREFROM, AS WELL AS THEIR PRESERVATION.

Edited from Various Sources by

WILLIAM T. BRANNT.
500 Pages, Cloth, \$2.50.

Sent, post-paid, on receipt of price by
DAVID WILLIAMS, Publisher and Bookseller
93-102 Reade St., New York,



WE GUARANTEE YOU

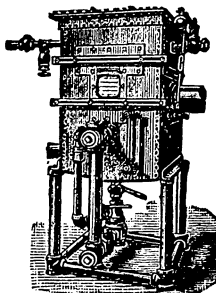
a very considerable saving in the items of water and fuel by the use of our Vacuum Feed Water Heater and Purifier, and this means, of course, an extra profit on your output. The "how" will be found in a comprehensive Catalogue, which is yours for the asking, also Catalogues of the Webster Separator and Willamies Vacuum System of Steam Heating.

WARREN WEBSTER & Co.,

NEW YORK, 126 Liberty Street.
CHICAGO, Monadnock Building.

No. 2.

CAMDEN, N. J.



WE NEVER SOLD ONE

of our Vacuum Feed Water Heaters and Purifiers until we had first satisfied our customer that it was capable of saving money for him. Our Catalogue will make this saving clear to you. Shall we mail it? We also build the Webster Separator and Willamies Vacuum System of Steam Heating.

WARREN WEBSTER & Co.,

NEW YORK, 126 Liberty Street.
CHICAGO, Monadnock Building.

No. 8.

CAMDEN, N. J.

Awarded the Grand Prize at Late Paris Exposition.

SEND FOR THIS BOOK

FREE ON APPLICATION.

THE BABCOCK & WILCOX CO. WATER TUBE STEAM BOILERS

30 CORTLANDT ST. N.Y.

BRANCH OFFICES:

- BOSTON, MASS. 8 OLIVER ST.
- PHILADELPHIA, PA. 32 N. 5TH ST.
- PITTSBURGH, PA. 408 LEWIS BLOCK
- CLEVELAND, O. 412 PERRY-PAYNE BLDG.
- CHICAGO, ILL. 45 S. JEFFERSON ST.
- MINNEAPOLIS, MINN. 604 CORN EX.
- NEW ORLEANS, LA. 57 CARondelet ST.
- HAVANA, CUBA. 116 CALLE DEL MUNICIPIO

MANUFACTORIES IN UNITED STATES, SCOTLAND, FRANCE, GERMANY & AUSTRIA.

R. POOLE & SON CO.
ENGINEERS, FOUNDERS and MACHINISTS.
BALTIMORE, MD.

MANUFACTURERS AND DESIGNERS OF ALL KINDS OF
HEAVY MACHINERY,
REQUIRING FIRST CLASS WORKMANSHIP AND MATERIALS.

BAND, ROPE and FLY WHEELS, FRICTION CLUTCHES, SHAFTING, PULLEYS and HANGERS.

MACHINE MOLDED AND PLANED GEARING

MACHINERY FOR WHITE LEAD and FERTILIZER WORKS,
GRAIN ELEVATORS and FLOUR MILLS, BRASS, COPPER
and TIN PLATE ROLLING MILLS, CABLE and MARINE RAILWAYS.
POOLE-LEFFEL TURBINE WATER WHEELS.
DREDGING MACHINES.
CIRCULARS ON APPLICATION.
IRON CASTINGS of 30,000 LBS. TENSILE STRENGTH.

RAND DRILL COMPANY.

We were Awarded the Highest Premium at the WORLD'S COLUMBIAN EXPOSITION on the following:

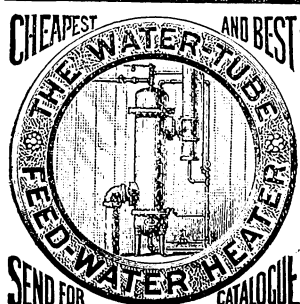
DUPLEX COMPOUND STEAM AND COMPOUND AIR COMPRESSOR,
AT MACHINERY HALL,

And the following, exhibited at Mines and Mining Building:

High Pressure Compressor, Straight Line Compressor,
Little Giant Rock Drill, Slugger Rock Drill,
Furnace Tapping Drill, Shaft Bar,
Column, Derby Bit, and
Award on Collective Exhibit of Compressors and Drills.

RAND DRILL CO., - 23 Park Place, N. Y.

THE GOUBERT FEED WATER HEATER



**MOST EASILY CLEANED,
MOST EFFECTIVE,
MOST DURABLE.**

Defies Competition in these qualities and in price.

Brass tubes free to expand. Pressure being inside, tubes will never collapse. Heats the water to the highest point. No chance for back pressure. 20 sizes. 50 to 1500 horse-power.

The Goubert Mfg. Co.,
14 and 16 Church St., Corner Cortlandt, New York.

ELECTRICAL BOOKS.

Standard Tables for Electric Wiremen, with Instructions for Wiremen and Linemen. Rules for Safe Wiring, Diagrams of Circuits and Useful Formule and Data. By CHARLES M. DAVIS. Third edition, thoroughly revised and edited by W. D. Weaver. Illustrated, 18mo, mor.\$1.00

Practical Electric Light Fitting. By F. C. ALLSOP. A treatise on the wiring and fitting-up of buildings deriving current from central station mains and the laying down of private installations. 290 pages, 12mo, cloth.\$1.50

Electrical Tables and Memoranda. By SYLVANUS P. THOMPSON and E. THOMAS. 128 pages, 2 x 2 3/4 inches, roan.\$0.50

Johnston's Electrical and Street Railway Directory. Fourth Year of Publication, 8vo, cloth.\$5.00

Measurements of Electric Currents. Electrical Measuring Instruments, by JAMES SWINBURNE. Meters for Electrical Energy. By C. H. WORDINGHAM. Edited by T. COMMERFORD MARTIN. Illustrated, 1 folding plate.\$0.50

Alternating Currents of Electricity. By GIBERT KAPP. Their Generation, Measurement, Distribution and Application. Authorized American edition. With an introduction by WILLIAM STANLEY, JR. (Reprinted from Professional Papers of the Corps of Royal Engineers). Illustrated, 12mo, cloth.\$1.00

The Electric Railway in Theory and Practice. By O. T. CROSBY and DR. LOUIS BELL. Second edition, revised and enlarged, 183 illustrations. 8vo, cloth.\$2.50

The Measurement of Electrical Currents and Other Advanced Primers of Electricity. By E. J. HOUSTON. 429 pages, 169 illustrations.\$1.50

The Science and Practice of Lighting, as applied to sheets, open spaces and interiors. By W. H. Y. WEBBER. An elementary study. A series of articles contributed to the *Journal of Gas Lighting*, etc. 8vo, cloth.\$1.40

Electric Lighting for Marine Engineers; or, How to Light a Ship by the Electric Light and How to Keep the Apparatus in Order. By SYDNEY F. WALKER. 293 pages, illustrated, 8vo, cloth.\$2.00

The Dynamo, Its Theory, Design and Manufacture. By C. C. and F. WALLIS HAWKINS. 190 illustrations. Thick 12mo, cloth. (The Specialists' Series).\$3.00

Electrical Distribution. By M. H. KILGOUR, H. SWAN and C. H. W. BIGGS. Its Theory and Practice. 174 illustrations 12mo, cloth.\$4.00

How to Use Electrical Measurement Apparatus. By CHAS. P. FREY. A Manual of Practical Information Relating to Electrical Testing. Illustrated. 8vo, paper.50c.

Portable Electricity: Being a Treatise on the Application, Methods of Construction and Management of Portable Secondary Batteries. By J. T. NIBLETT. Fully illustrated. 8vo, cloth.\$1.00

Practical Dynamo Building. By L. C. ATWOOD. With Detail Drawings and Instructions for Winding. Giving correct sizes of Wire, Dimensions of Iron, etc. etc., also Diagram for House Wiring. Illustration and Plates. 4to, cloth.\$3.00

The Electric Transmission of Intelligence. By PROF. E. J. HOUSTON. And other Advanced Primers of Electricity. 88 illustrations. 12mo, cloth.\$1.00

The Dynamo, How Made and How Used. By S. R. BORTONE. Eighth edition, with additional matter and illustrations. 12mo, cloth.\$1.00

Dynamos, Alternators and Transformers. By G. D. KAPP. Giving an exposition of the general principles underlying the construction of dynamo-electric apparatus without the use of high mathematics and complicated methods of investigation. 12mo, cloth.\$4.00

Electric Light Installations. By SIR D. SALOMONS. In 3 vols. Vol I. The Management of Accumulators; a practical handbook. Seventh edition, revised and enlarged, 164 pages, 12mo, cloth.\$1.50

Sent, post-paid, on receipt of price by

DAVID WILLIAMS,

Publisher and Bookseller,

96-102 Reade St., New York.

ESTABLISHED 1876. INCORPORATED 1893.

ERIE ENGINE WORKS

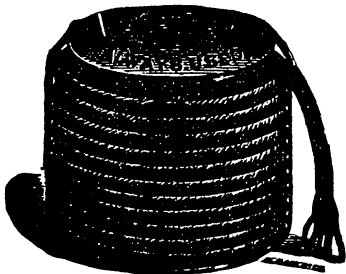
(CLEVELAND & HARDWICK.)



ERIE, PA.
Manufacturers of

STEAM ENGINES AND BOILERS.

ROLLASON GAS ENGINES
RELIABLE AND ECONOMICAL
Send for Catalogue, etc. HAVEMET BLDG. NEW YORK

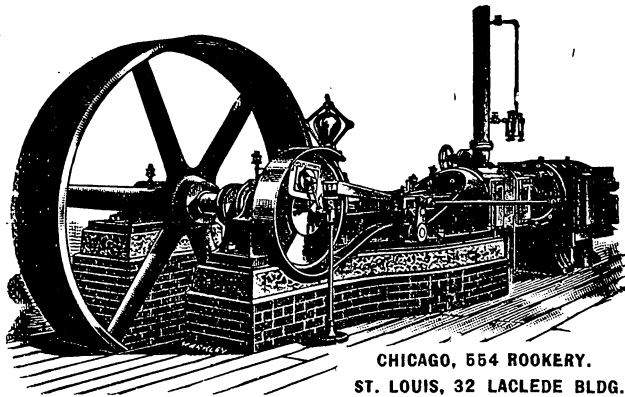


Send for a Sample of
Morrison's Patent Self-Lubricating Packing,
ROBT. MORRISON,
5034 Arsenal St., St. Louis, Mo.

BOSTON GEAR WORKS
37 Hartford St., Boston, Mass.
HEADQUARTERS FOR GEARS.
Book on Gears, 170 Illustrations, \$1.00. Job Gear Cutting of all kinds. Spur, Bevel, Spiral, Ratchet, Worm, Rack, Elliptic, Index Plates, &c. Very small or large. Send for 1892 Catalogue; 906 sizes of Gears FREE to any business firm.

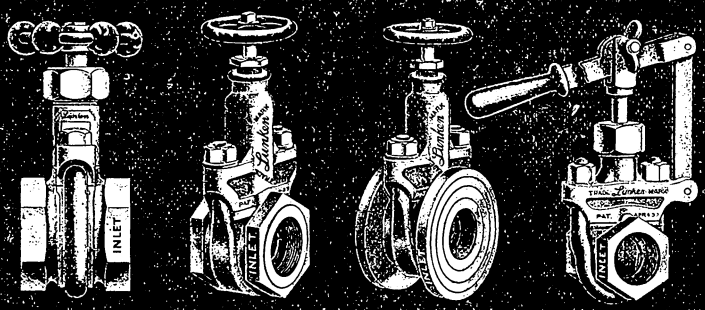


SEND FOR CATALOGUE "A."



SOUTHWARK FOUNDRY AND MACHINE CO.,
Philadelphia, Pa.
Sole Makers of
THE PORTER-ALLEN AUTOMATIC ENGINE,
SIMPLE, COMPOUND
OR TRIPLE EXPANSION.
Also Builders of
BLOWING ENGINES, REVERSING ENGINES, CENTRIFUGAL PUMPS, BOILERS, TANKS, ETC.

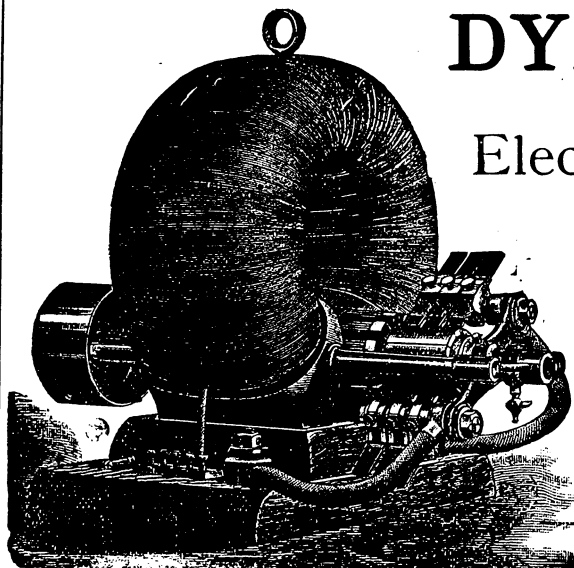
SPECIFY AND INSIST UPON THE "LUNKEN" RENEWABLE SEAT GATE VALVE AND YOU WILL GET THE BEST.



BRASS. IRON SCREW ENDS. IRON FLANGE ENDS. QUICK OPENING.

WARRANTED THE MOST PERFECT VALVE MADE FOR LIGHT AND HEAVY PRESSURE. IN BRASS 1/4" TO 3". IRON SCREW AND FLANGE ENDS 2" TO 12". CIRCULARS AND PRICES UPON REQUEST. FOR SALE BY LEADING DEALERS EVERYWHERE.

THE LUNKENHEIMER COMPANY, CINCINNATI, O. U.S.A.
SOLE MAKERS OF THE "LUNKENHEIMER" SPECIALTIES.



DYNAMOS

—FOR—
Electro-Plating.

SIMPLE, DURABLE and EFFICIENT.

The Best Machine Made.
Satisfaction Guaranteed.

—THE—
Eddy Electric Mfg. Co.
Windsor, Conn.

NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN

\$100

Per thousand words is what Robt. Louis Stevenson gets for his stories. The difference twixt Bob and us is that we pay more than that to *The Iron Age* for the privilege of writing; but there is method in this extravagance, it all comes back. Have we ever had anything from you? Do you know that BONNELL'S NUBIAN IRON ENAMEL is the best black on earth for all Iron Work? Write us just a postal card and get our story and the next issue of our quarterly calendar.

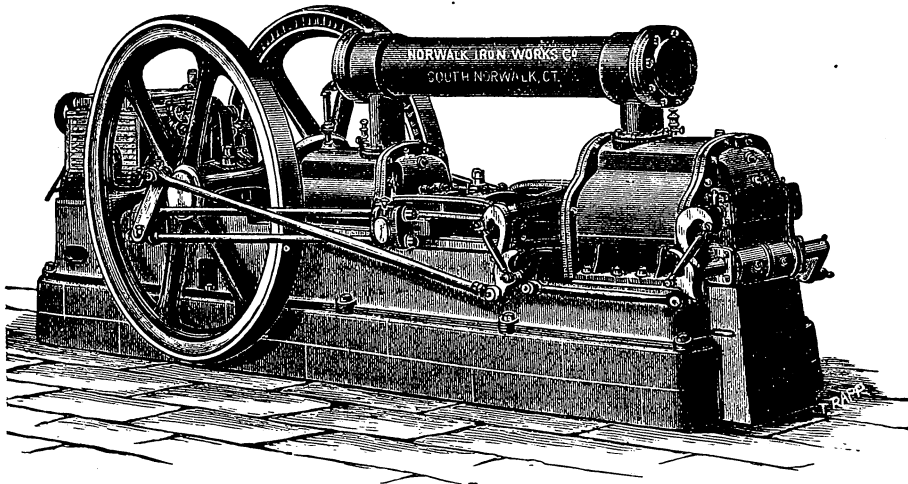
77 Warren St., New York, N. Y.
Hall & Carpenter, Philadelphia.
Taylor Goodrich, San Francisco.

THE NUBIAN IRON ENAMEL CO.,

33-35 Nubian Ave.,
CRAGIN, ILL.

NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN

Air Compressors.



THE NORWALK IRON WORKS CO., South Norwalk, Conn.

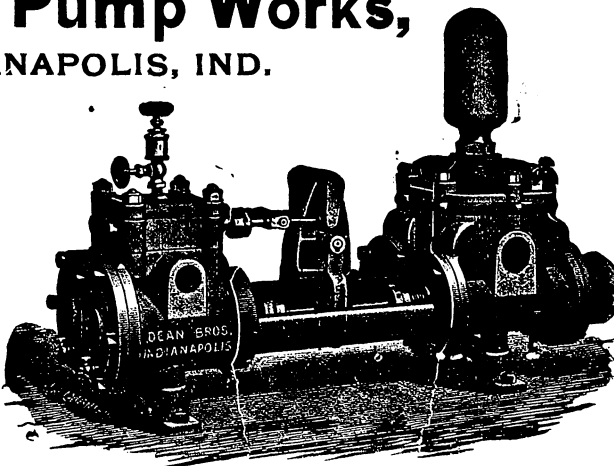
DEAN BROTHERS
Steam Pump Works,
 INDIANAPOLIS, IND.

DUPLEX PUMPS.

SINGLE PUMPS.

**DEEP WELL
PUMPS.**

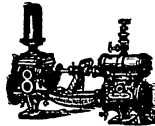
Send for Catalogue
and Prices.



**CHEAPEST.
HANDIEST.
SIMPLEST.**

Handling Dirty, Gritty and Sandy Liquids without Wear, Oil or Care. Pumping outfit for Contractors, Mining, Irrigating, Railroad, Quarry, Drainage and Manufacturing purposes. Second-hand Engines, Boilers, Pumps, and other Machinery always on hand. Exchanging.

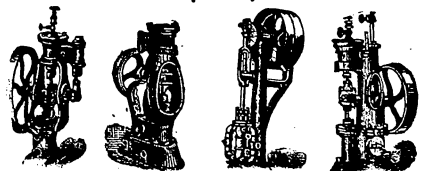
MASLINS, 165-167 First St., Jersey City, N.J.



Send
for
Prices.



VALLEY PUMP CO.
 Easthampton, Mass.



The JOHN H. MCGOWAN CO.

RIVAL STEAM PUMP, TWIN LEVER DUPLEX, 1893 SLIDE BOILER FEEDER, TRIPLEX, DEEP WELL PUMP.

PUMPS FOR EVERY SERVICE **CINCINNATI, OHIO.** **PRICE LIST ON APPLICATION**

Brass Founders and Mfrs. of every description of Brass and Iron body goods for steam, gas and water.

FACTORY OFFICE 46 CENTRAL AVE.

BRANCH HOUSE: 1425 E. Main St., Richmond, Va.

Worthington Steam Pumps

CONDENSERS and WATER METERS.

HENRY R. WORTHINGTON,

86 & 88 LIBERTY STREET, NEW YORK.

BOSTON, ST. LOUIS, PHILADELPHIA, DENVER, CHICAGO,

The WATERBURY-FARREL FOUNDRY & MACHINE CO., Waterbury, Connecticut,

Builders of Rolling Mill Machinery, Special Machines for finishing and making goods from Sheet Brass, Copper, Steel Silver, &c., **POWER PRESSES, HYDRAULIC PRESSES, Drop Presses, Foot Presses, RIVET MACHINES, Gang Slitters, Grinding Machines, Steel Rolls, Wire Mill Machinery, Tube Drawing Machinery, Dies, &c.**



EXPERIMENTAL ELECTRICITY.

By **EDWARD TREVERT.**

Illustrated. - Cloth. - \$1.00.

CONTENTS—Some Easy Experiments in Electricity and Magnetism; How to Make Electric Batteries; A Galvanometer; An Induction Coil; An Electric Bell; A Magneto Machine; A Telegraph Instrument; An Electric Motor; A Dynamo; Electric Bell Fitting and Gas Lighting; Electric Lamps; Electric Terms.

Sent postpaid on receipt of price by

DAVID WILLIAMS, Publisher & Bookseller,
 96-102 Reade St., New York.

The Brown Hoisting and Conveying Machine Co.,

CLEVELAND, OHIO, U. S. A.,

Sole manufacturers of the

"BROWN HOIST"

A NEW AND COMPLETE SYSTEM FOR HANDLING OF MATERIALS.

The Brown Patent Cable Tramway system.

The Brown Patent Suspended Beam Tramway system.

The Brown Patent Bridge Tramway system.

The Brown Patent Shed Tramway system.

The Brown Patent Furnace Stock Distributor.

The Brown Patent Warehouse Tramway system.

The Brown Patent Sewer Machine Tramway system.

The Brown Patent Continuous Elevated Tramway system.

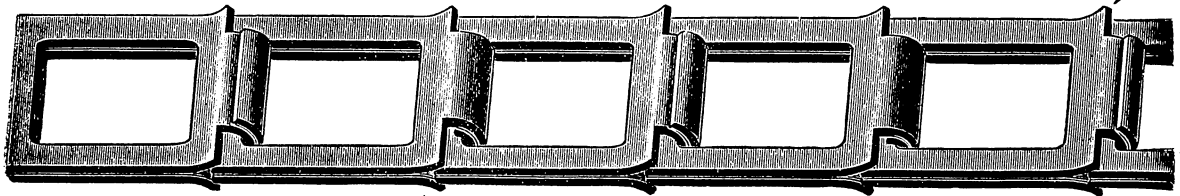
The Fayette-Brown Patent Automatic Furnace Hoist.

The Brown Patent Friction Clutch Hoisting Engine.

Self-Dumping Buckets, Skip Cars, Friction Clutches, etc.

The Most Perfect Clutch.

ROBERTS MFG. CO. - - - PITTSBURGH, PA.



PATENT DETACHABLE STEEL LINK BELTING,

Sprocket Wheels and Shafting.

Send for Catalogue and Price-List.

ALEXANDER BROS. BEST OAK BELTING.

PHILADELPHIA.

Patterson, Gottfried & Hunter, Limited, agents,
146-150 Centre St., New York, N. Y.

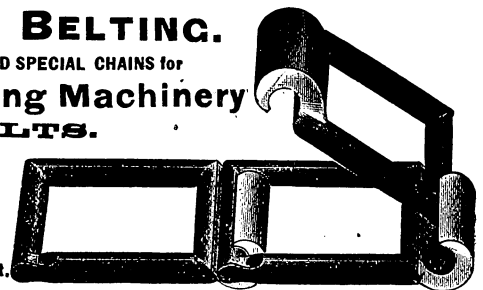
JEFFREY CHAIN BELTING.

Also MALLEABLE, WROUGHT, STEEL AND SPECIAL CHAINS for
Elevating and Conveying Machinery
DRIVE BELTS.

Send for Illustrated Catalogue and Reduced
Price-List.

THE JEFFREY MANUFACTURING CO
COLUMBUS, OHIO, U. S. A.

New York Branch, 163 Washington St.



DURANT COUNTING MACHINES

Received the Highest Award at the
World's Columbian Exposition.



Send for
Catalogue
to

W. N. DURANT, 234 22d St., Milwaukee, Wis.

PITTSBURGH MFG. CO.,

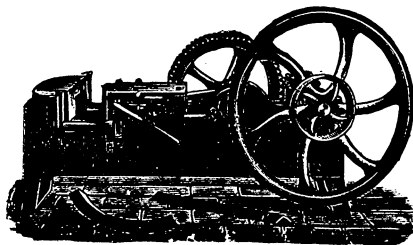
Manufacturers of

**Crosgrove's Patent Straight-
ening, Bending and Punch-
ing Machines.**

NAIL MACHINERY.

Bolts, Nuts, Rivets, Castings, &c.

PITTSBURGH, . . PA.



FOR THE "Double Triple Quick Stroke" SHAPER

WRITE TO

GOULD & EBERHARDT, Newark, N.J



12 in. 16 in., 20 in., 24 in., 28 in., 30 in. stroke.

Fitchburg Machine Works, MANUFACTURERS OF * METAL WORKING MACHINERY *

Nos. 13 to 21 MAIN ST.,
FITCHBURG, MASS.

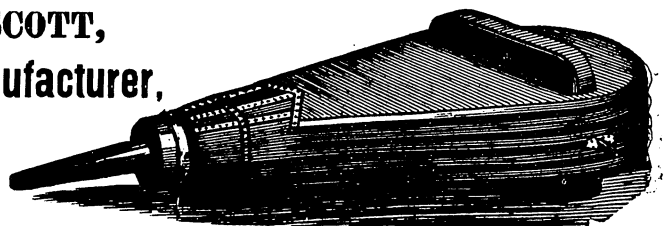
Send for Catalogue B.

GEO. M. SCOTT, Bellows Manufacturer,

Johnson Street

Cor. 22d St.,

CHICAGO, ILL.



Description of Dixon's Perfect Lubricating Graphite.

It is an absolutely pure, foliated, water-dressed and air-floated American Graphite, from our own mines at Ticonderoga, N. Y. It has unrivaled smoothness and endurance. It is entirely inert and not affected by heat, cold, steam, acid, or any known chemical. It largely increases the lubricating value of oils and greases. It may be mixed in water, oil or grease, or used dry, according to conditions or requirements.

The proper selection and perfecting of Graphite for lubricating purposes is a matter requiring great skill, much machinery and long experience. We have made this a special study, and by methods of dressing and perfecting peculiar to ourselves, have produced a Graphite unequalled for purity, for uniformity in size of flake and lubricating qualities.

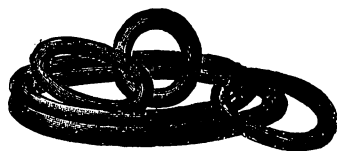
Trade
Nos.

PRICES.

630—	1/4 lb. paper cans.....	10	cents each.
631—	1/2 " " " ".....	15	" "
632—	1 " " " ".....	20	" "
635—	5 " " " ".....	80	" "
633—	5 " tin cans, screw top.....	85	" "
634—	10 " " " ".....	\$1.60	" "
644—	25 " boxes.....	14	" per lb.
645—	50 " " " ".....	13	" "
646—	100 " kegs.....	12	" "
647—	350 " bbls.....	10	" "

JOS. DIXON CRUCIBLE CO., Jersey City, N.J.

An interesting pamphlet on the subject is sent free of charge on request.

H. O. CANFIELD,
MOULDED BRIDGEPORT, CONN.

RUBBER GOODS
FOR MECHANICAL PURPOSES.

Small moulded work a
specialty. Send for esti-
mates for moulds and work.

JOHN ADT & SON,

New Haven, Conn.

BUILDERS of MACHINERY for HARDWARE MANUFACTURE

BUTT MILLING MACHINERY,

BUTT DRILLING MACHINERY,

RIVETING MACHINES,

WIRE STRAIGHTENING

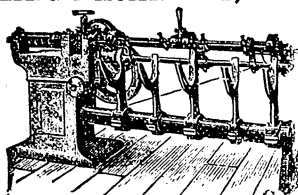
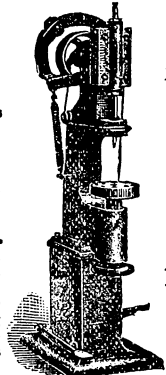
MACHINERY,

FOOT PRESSES,

SPRUE CUTTERS,

ETC.

Elastic Rotary-Blow Riveting Machine.



Automatic Wire Straightening and Curving Machine.

LEVIATHAN BELTING.



Positively unequalled for Strength, Durability and Traction Power; unaffected by Heat, Steam or Water.

Belts for Main Driving and work of a heavy nature a specialty.

MAIN BELTING
COMPANY,

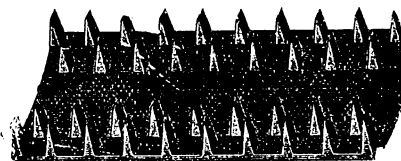
Sole Manufacturers,
1249-1235 Carpenter St.,
PHILADELPHIA.

248 Randolph Street, Chicago.

120 Pearl Street, Boston.

Send for Price-Lists and Samples.

Talcott's Original Wilson Belt Hooks.



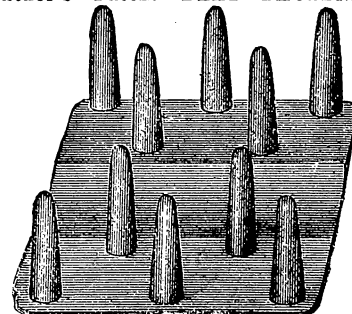
W. O. TALCOTT, Providence, R. I.

MANUFACTURER OF

Four Styles of BELT HOOKS, Including 134 Sizes.

SEND FOR CATALOGUE.

Thacher's Patent BELT FASTENERS



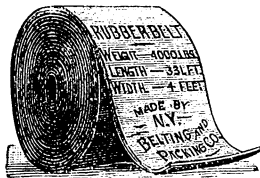
Manufactured by
The Claffen Manufacturing Co., Cleveland, O.
Office, 71 and 73 Ontario St.

NEW YORK BELTING & PACKING CO. LTD

OLDEST, LARGEST and BEST Makers of

Rubber Goods

FOR MECHANICAL USES.



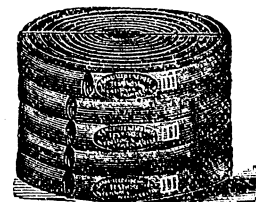
Rubber belting, hose, steam hose, brewer's hose, suction hose, "Test" fire hose, cotton hose, packing, valves gaskets, rings, vulcanite emery wheels, rubber covered rolls, tubing, rubber cement, mats, matting, stair treads, bicycle and vehicle tires, car springs, fruit jar rings, etc. Special goods to order.



Send for Catalogue.

PIONEERS AND LEADERS.

15 Park Row, New York.



STORES: Boston, Philadelphia, Chicago, Cincinnati, Minneapolis, Cleveland, San Francisco, Detroit, Baltimore, Charleston, New Orleans, Kansas City, St. Louis, Dallas.

AGENTS WANTED IN UNOCCUPIED TERRITORY.

E. W. BLISS CO.,

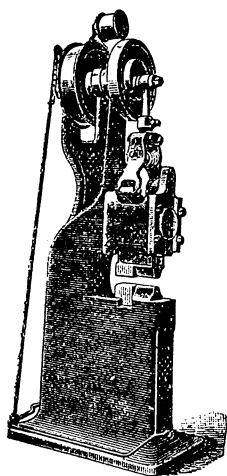
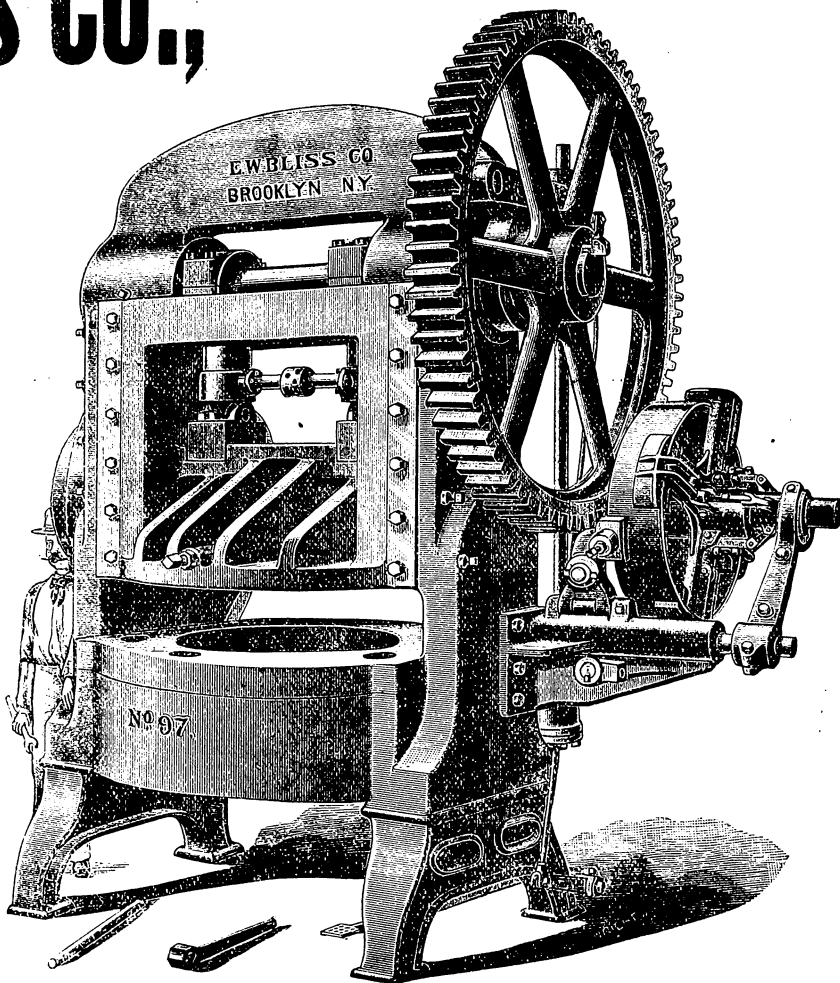
WESTERN OFFICE, 14 N. CANAL ST., CHICAGO.

11 ADAMS ST., BROOKLYN, N. Y.

These presses are intended for operating large and accurate cutting and perforating dies, such as armature rings, etc. They are made in a number of sizes.

**PRESSES,
PUNCHES,
SHEARS,
DROP
HAMMERS,
DIES
AND
SPECIAL
MACHINERY.**

The Stiles & Parker Press Co.



The Dupont Power Hammer.

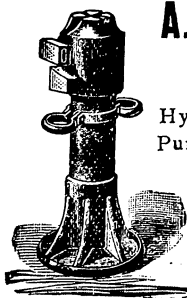
The Dupont Power Hammer STANDS FIRST

IN

{ Simplicity of Adjustment,
Simplicity of Construction,
Economy of Power,
Economy of Space,
Durability,

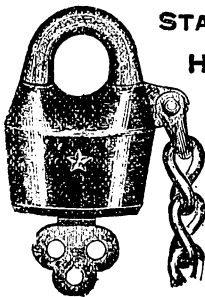
And costs less than any hammer built. Send for our new descriptive circular to

**The Dupont Manufacturing Co.,
ST. JOHNSBURY, VT.**



A. L. HENDERER,
Wilmington, Del.

MANUFACTURER OF
Hydraulic Jacks, Hydraulic
Punches, Screw Punches,
Steel Tube Expand-
ers, Flue Hole Cut-
ters, Boiler Test
Pumps and Pipe
Vises.

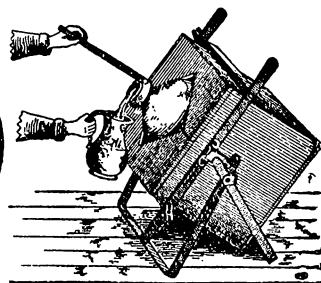


STAR LOCK WORKS, PHILA.

HILLEBRAND & WOLF,

MANUF'RS OF
1ST QUALITY ONLY
SCANDINAVIAN
AND
SPRING PADLOCKS
TRUNK & CASE LOCKS

CARBOY STANDS, &C.
CATALOGUES SENT ON APPLICATION.



RIEHLE

BROS. TESTING MACHINE CO., Phila., have issued a new describing and illustrating all the various styles of their U. S. Standard Testing Machinery with the special appliances. Marble Machinery, Rope Twisters, Loom Mills, Riehle-Robie Frictionless Ball Screw Jacks, Iron and Wooden Trucks, &c., &c., are described. It is desired to have one of these Catalogues in the office of every Superintendent, Purchasing Agent, Engineer or Manufacturer using such Machinery. A copy will be mailed free of charge to those who may apply.

CAT. No. 3

LINK-BELT

ENGINEERING CO
NICETOWN,
PHILA
49 DEY ST.
NEW YORK

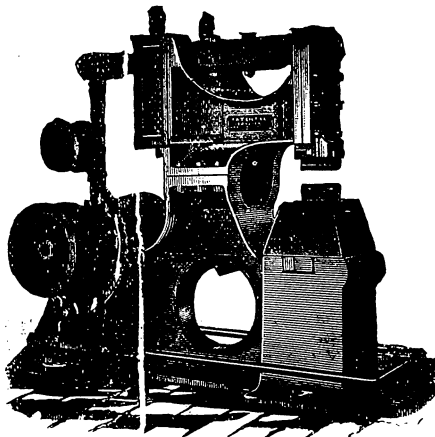
Elevators, Conveyors, Manila Rope Power Transmission Machinery, Ewart Detachable Link Belting, Dodge Chain, Howe Chain, &c.

General Eastern Agents for Fibre-Graphite Journal Bearings for shafting and machines. Require no oil or other lubricant. Moderate in price, durable and guaranteed. Bearings furnished to fit hangers now in use.

WESTERN CONNECTION

[CHICAGO,] LINK BELT MACHINERY CO.

JENKINS' POWER HAMMERS.



Adjustable and elastic stroke, nicety of regulation, efficiency of action, simplicity and durability of construction and the absence of leather straps, steel springs and all complication, combine to make this hammer the favorite wherever used.

JENKINS & LINGLE,
BELLEFONTE, PA.

Presses of all kinds for

SHEET METAL WARE.

Wiring, Blanking and Combination Dies a Specialty.

Just out. Special new machinery

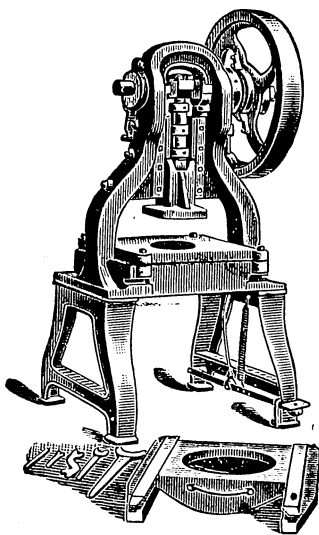
FOR MAKING ROUND, SQUARE AND

CORRUGATED CONDUCTOR PIPE

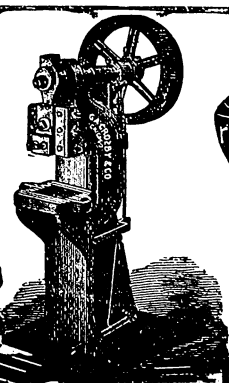
In 10 Feet Lengths.

WILL TURN OUT 10,000 FEET PER DAY.

Stark Machine & Tool Co.,
BUFFALO, N. Y.



G. A. CROS
Manufacture
PRESSE
SPECIAL MA
SHEET METAL
176 178 So. Clinton

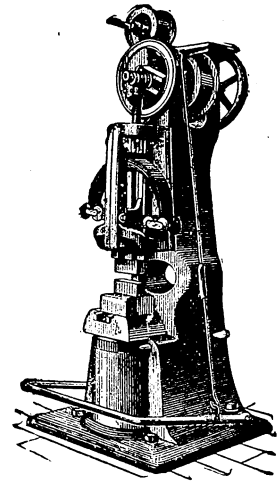


BY CO.
S. DIES
CHINERY
WORKERS
Str., Chicago, Ill.

If You Use Power Hammers

Write to us for Circulars.

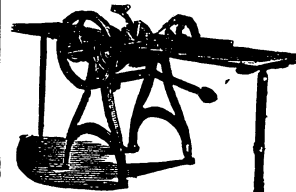
SCRANTON & CO.,
NEW HAVEN, CONN.



Chicago Office, 65 South Canal Street.

BARNES

Hand and Foot Power Machinery,
FOR CARPENTERS AND BUILDERS.



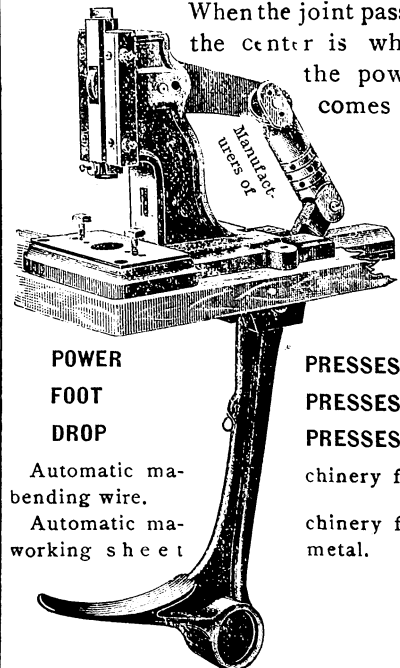
Complete Line
of Seven
Machines.
Hand Circular
Rip Saw
Combined Rip and
Cross-Cut Saw
(with Scroll Saw
and Boring At-
tachments).
Scroll Saw, For-
mer, Mortiser,
Tenoner & Lathe

Discounts to the trade on application. Send for Catalogue and Price-List.

W. F. & JOHN BARNES CO.,
69 Ruby Street, ROCKFORD, ILL.
ENGLISH AGENTS, CHAS. CHURCHILL & CO.,
21 Cross Street, Finsbury, E. C., London

Cross & Speirs Machine Co.,

When the joint passes
the center is when
the power
comes in.



POWER
FOOT
DROP

Automatic ma-
bending wire.
Automatic ma-
working sheet

PRESSES.
PRESSES.
PRESSES.

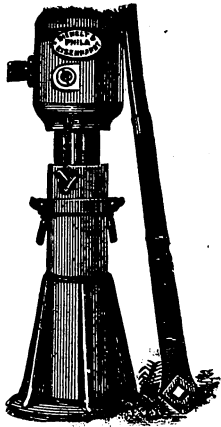
chinery for
chinery for
metal.

31 TO 37 CANAL STREET,
WATERBURY, CONN.

Handbook of Ornament. By FRANZ SALES MEYER.
A grammar of art industrial and architectural de-
signing in all its branches, for practical as well as
theoretical use. Authorized English edition. 580
pages, illustrated, cloth. \$3.60
For Sale by David Williams, 96-102 Reade St., N. Y.

RELIANCE HYDRAULIC JACKS.

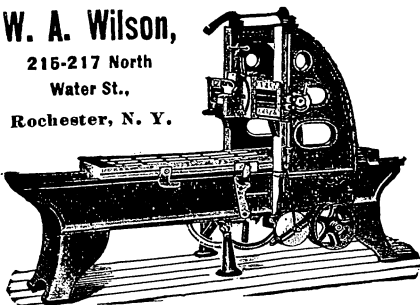
SUPERIOR TO ANY JACK NOW MADE.
Absolute in its actions in any position.
Under complete and instantaneous control.



MADE IN FOUR SIZES,
10, 15, 20 and 30-ton capacity, to lift 12 or
18 inches. Broad Base or Ground Lift.

DIENELT & EISENHARDT,
MAKERS,
1308 Howard Street, Philadelphia.

W. A. Wilson,
215-217 North
Water St.,
Rochester, N. Y.

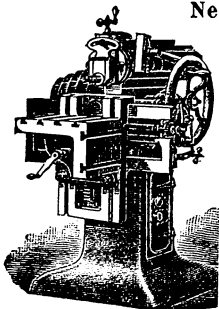


Improved Iron Planers a specialty. 20 x 20, 22 x 22
24 x 24 up to 42 x 42, to plane any length. Send for
description and price-list before purchasing. Manu-
facturers' agent for other tools and machinery. Men-
tion *The Iron Age*.

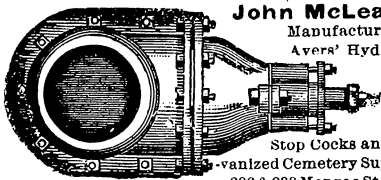
NEW HAVEN MANUFACTURING CO.,

New Haven, Conn.

Manufacturers of



**Lathes,
Planers,
Drills,
Slotters,
ETC.**



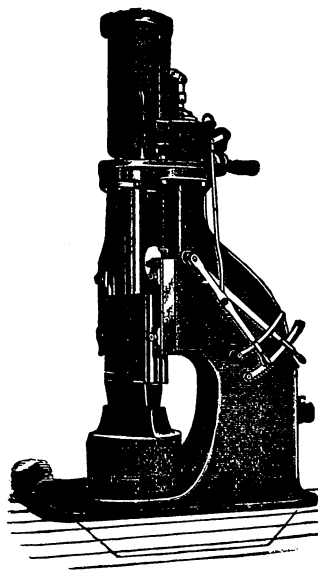
John McLean,
Manufacturer of
Avers' Hydrants

Stop Cocks and Gal-
vanized Cemetery Supplies
296 & 298 Monroe St., N. Y.

**A Practical Workshop Compa-
nion for Tin, Sheet-Iron and
Copper-Plate Workers.** By LEROY J. BLINZ
new revised, enlarged edition. with over 170
newly engraved illustrations: 296 pages: 12mo
cloth.....\$2.50

This deservedly popular book has been thor-
oughly revised and contains over 100 additional
pages, with 170 newly engraved illustrations.
The volume contains rules for describing vari-
ous kinds of Patterns used by Tin, Sheet-Iron
and Copper-Plate Workers: Practical Geometry
Measurement of Surfaces and Solids: Tables of
the Weights and Strengths of Metals and other
Materials: Tables of Areas and Circumferences
of Circles: Composition of Metallic Alloys and
Solders, with numerous valuable Receipts and
Manipulations for every-day use in the work
shop.

Sent, postpaid, on receipt of price, by
DAVID WILLIAMS, Publisher and Bookseller,
86-102 Reade St., New York.



Bement, Miles & Co.,

PHILADELPHIA, PA.,

Builders of

**Metal-Working
Machine Tools**

For railroad shops, locomotive and car builders,
machine shops, steam forges, shipyards, boiler
shops, bridge works.

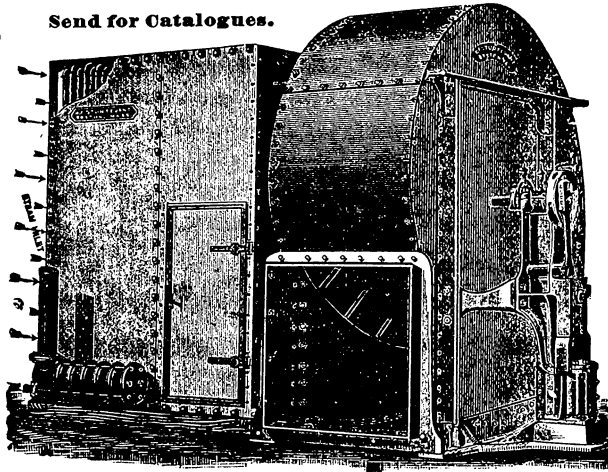
**Steam Hammers for Working Iron
or Steel.**

NEW YORK OFFICE. Equitable Building.

GEORGE PLACE, Agent.

**THE STURTEVANT SYSTEM OF
HEATING AND VENTILATING**

Send for Catalogues.



Manufacturing
Establishments.

**PRESSURE
BLOWERS.
PORTABLE
FORGES.**

B. F. Sturtevant Co.,
Boston, Mass.

91 Liberty Street,
NEW YORK.

16 South Canal St.
CHICAGO.

130 North Third St.
PHILADELPHIA.

IF YOU WANT ANYTHING IN THE LINE OF
**DROP PRESSES · DROP HAMMERS ·
STAMPS OR AUTOMATIC
DROP LIFTERS**

SEND FOR CATALOGUE TO

Miner & Peck Mfg. Co.
New Haven, Conn.
LARGEST LINE IN THE MARKET.

Engravings Show the Style of Die
Head which the

Bignall & Keeler Mfg. Co.,

ST. LOUIS, MO.,

PLACE ON THEIR

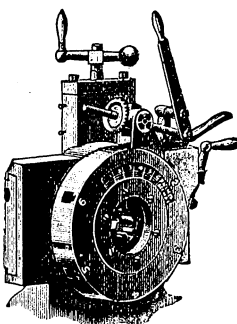
PEERLESS AND DUPLEX

Pipe Threading & Cutting Machines.

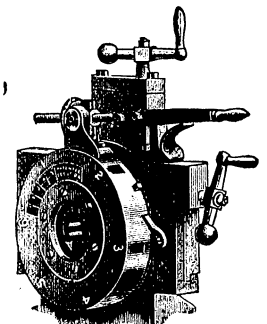
Write for Prices on the

Most Perfect and Economical Line
of Machines on the Market.

Mention *The Iron Age*.



"Peerless" Head showing
dies expanded.



"Peerless" Head showing
dies closed.

D. SAUNDERS' SONS,

MANUFACTURERS OF

PIPE Cutting AND Threading MACHINES

All sizes $\frac{1}{4}$ inch to 16 inch for Pipe Mill,
Gas and Steam Fitters' use. Tapping
Machines for steam-fittings, also

STEAM and GAS FITTERS' HAND TOOLS.

SEND FOR CATALOGUE.

No. 4 B Machine, $\frac{1}{4}$ to 4 inch.
Hand or Power.

No. 25 Atherton St., Yonkers, N. Y.

HYDRAULIC JACKS.

All sizes. All styles. All warranted.

HYDRAULIC PRESSES,

PUMPS, ACCUMULATORS, VALVES, GAUGES, FITTINGS, &c.

WATSON & STILLMAN, 204-210 E. 43d St., New York.

RICHARD DUDGEON,

No. 24 Columbia Street, New York.

Maker and Patentee of the Improved

Hydraulic Jacks AND Punches.

Roller Tube Expanders and Direct-Acting Steam Hammers.

Communications by letter will receive prompt attention.
Jacks for pressing on Car Wheels or Crank Pins made to order.

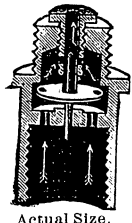
"ECONOMIST" GAS GOVERNOR.

GAS BILLS REDUCED 25 PER CENT.

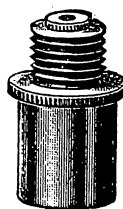
Retails for 30 cents and gives large profit to agent.
We place our governors on trial for 30 days and guarantee perfect satisfaction. Agents wanted in all cities and towns where gas is used. Write for circular and agents' price to

The New York Gas Saving Co.,

Decker Building, Union Square, N. Y.



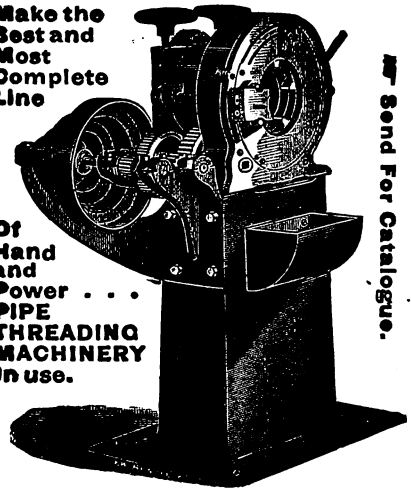
Actual Size.



The Merrill Manufacturing Co.,
Toledo, Ohio,

Make the
Best and
Most
Complete
Line

Of
Hand
and
Power . . .
PIPE
THREADING
MACHINERY
in use.



Send For Catalogue.

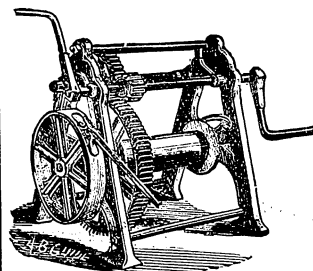
BUSINESS ESTABLISHED
1798.

INCORPORATED
1891.

JOS. F. MCCOY CO.,

26 Warren St., New York,

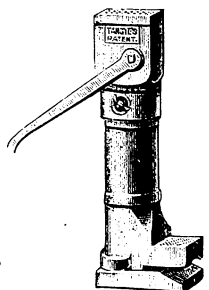
HEADQUARTERS FOR



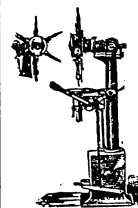
Hoisting
Crabs,
ALL IRON.

SIZES:
 $\frac{1}{2}$ ton to 70
tons.

Tangye's Hydraulic Jacks.



SIZES:
4 tons to 200 tons. Lifts
on foot or top.



QUINT'S TURRET DRILLS.

Six Spindle.

Drills from 1-32 to $\frac{1}{4}$ hole. Speed
from 250 to 2000 rev.

Suitable for a large variety of
work and is operated with ease
and rapidity.

SEND FOR CIRCULAR.

A. D. QUINT, Hartford, Conn.

STEEL TUBING

FOR BICYCLES, BOILERS, ETC.

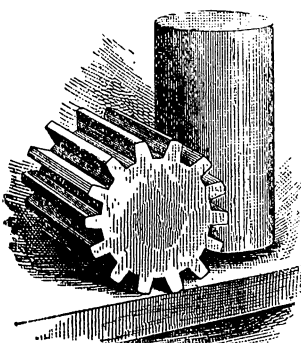
Round, Square, Corrugated, Bright or Annealed
STEEL TUBING up to 10 inches in diameter,
drawn from SOLID STEEL, for use on COL-
LARS, CYLINDERS, SLEEVES, SPIN-
DLES, FERRULES, BUSHINGS, etc.
Any thickness of walls desired.

THE UNITED STATES PROJECTILE CO.,

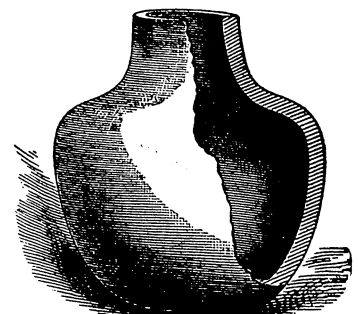
53d St. and 1st Avenue, Brooklyn, N. Y.

Patent Hot Pressed Pinions.

Hydraulic Forgings.

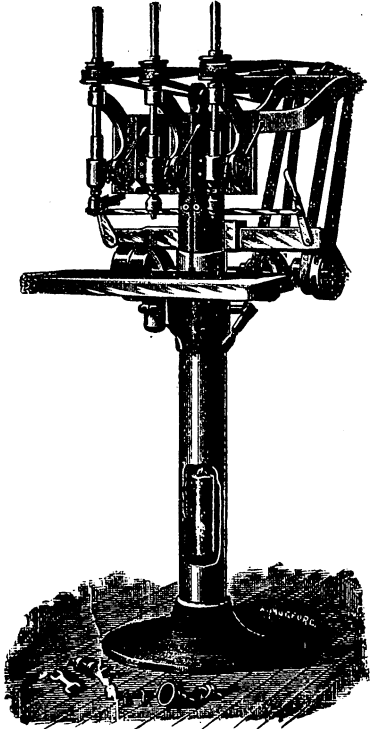


Billet and Patent Hot-Pressed Steel Pinion.



Steel Bottles, any thickness or shape.

SIGOURNEY DRILLS. IMPROVED.



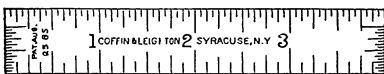
Sensitive, Strong and Interchangeable

One, Two and Three Spindles.

Counter-balanced Spindles and Tables. Vertical range of table, 30 inches, and it will swing to right or left.

SEND FOR CIRCULAR.

THE SIGOURNEY TOOL CO.,
Hartford, Conn.



MACHINISTS' SCALES,
PATENT END GRADUATION.

Liberal Discount to the Trade. Send for List.

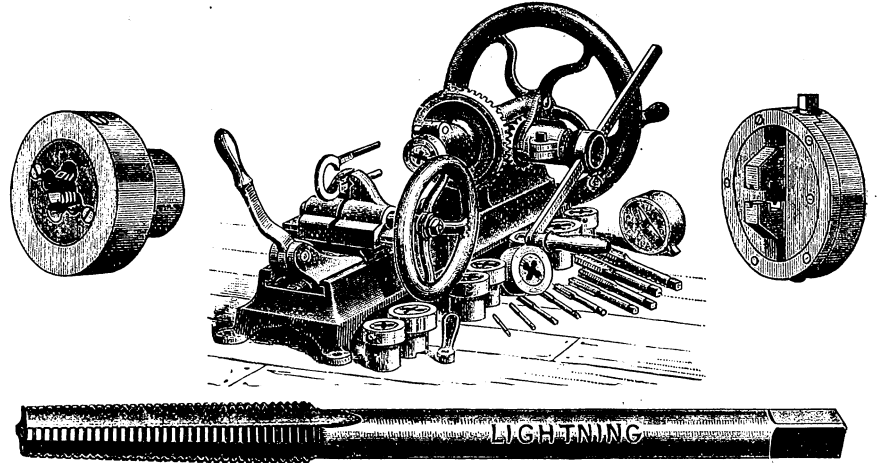
COFFIN & LEIGHTON, Syracuse, N. Y.

LIGHT DRILL PRESSES
MFRS. OF
THE LARGEST
VARIETY
SEND FOR NEW
30 PAGE CATALOGUE
JUST OUT
DWIGHT SLATE
MACHINE CO.
HARTFORD CONN.



OUR ADJUSTABLE STOCKS AND DIES are universally acknowledged to be the BEST! We also make all our Tools on the same principle of the Best Material and Workmanship, and always with a view of time and labor saving in their use.

Highest Quality of Bolt-Cutting and Nut-Tapping Machines. "Lightning" and "Green River" Brands of Tools and Machinery.
SEND FOR 168 PAGE CATALOGUE.



WILEY & RUSSELL MFG. CO.,

Greenfield, Mass., U. S. A.

New York Agency for Wiley & Russell, 114 Liberty St.

Maule's "Skeleton" Pipe Die

Two "Points" about it—only 2 (There are plenty more, but we only mention these two here.)

I

The First Cost to you of MAULE'S "SKELETON" PIPE DIE is less than that of any other Pipe-Threading Die—and

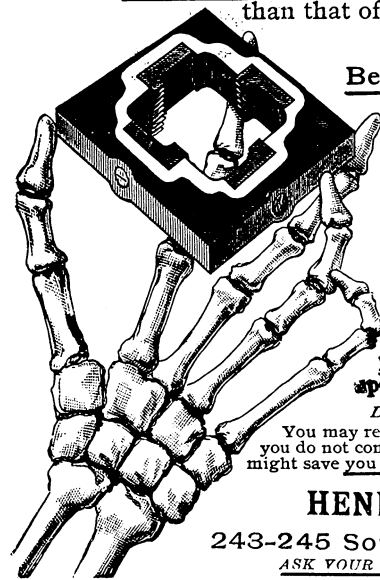
2

Before it becomes dull from use it will cut as many perfect threads as the best solid die extant, and when it is dull, you don't throw it away and buy a new one—Oh, no! You simply sharpen the cutters on a common grindstone, and so make it practically as good as it was at first, and this sharpening process may be repeated a number of times.

A sample One-inch "Skeleton" Pipe Die, either $2\frac{3}{8}$ or $2\frac{1}{2} \times \frac{3}{4}$ thick, by mail, postage prepaid, will cost you 62 cents, and will be sent upon receipt of a Postal note for that amount.

DO NOT SEND US ANY POSTAGE STAMPS.

You may return such sample to us, at our expense, if, after seeing it, you do not consider it worth the price. Don't the above sound as if it might save you some money—if TRUE?



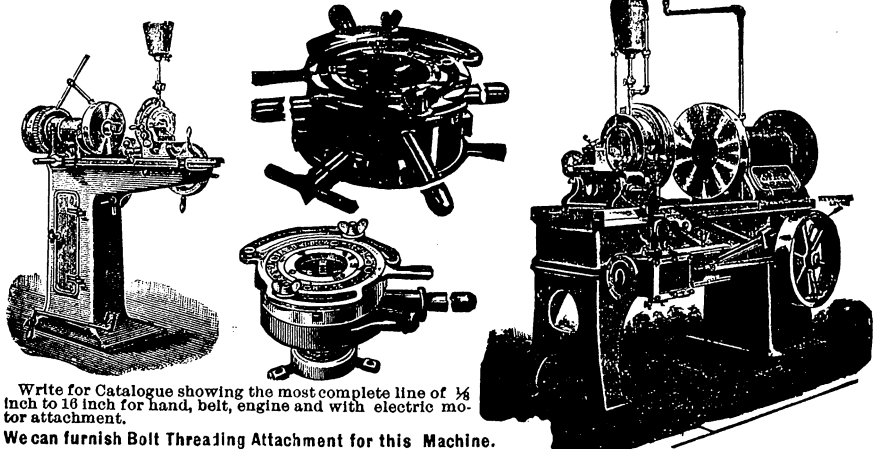
HENRY B. PANCOAST & CO.,

243-245 South 3d Street. Philadelphia, U. S. A.

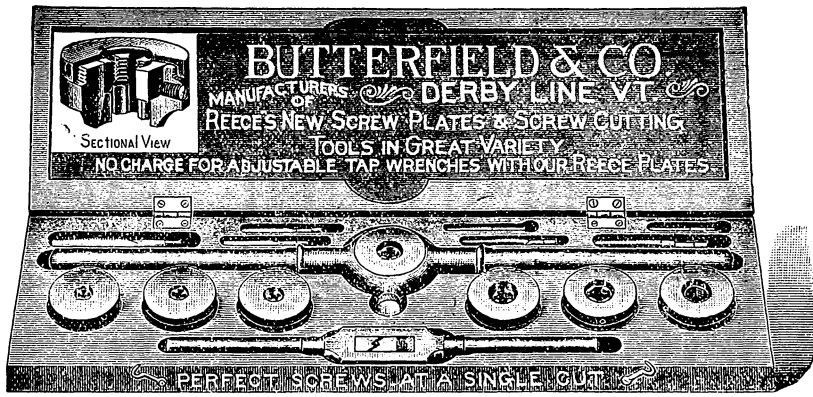
ASK YOUR JOURNER WHAT HE KNOWS ABOUT THIS TOOL.

JARECKI MFG. CO. (Limited), Erie, Pa.

PIPE THREADING AND CUTTING TOOLS OF ALL DESCRIPTION.



Write for Catalogue showing the most complete line of $\frac{1}{4}$ inch to 16 inch for hand, belt, engine and with electric motor attachment.
We can furnish Bolt Threading Attachment for this Machine.



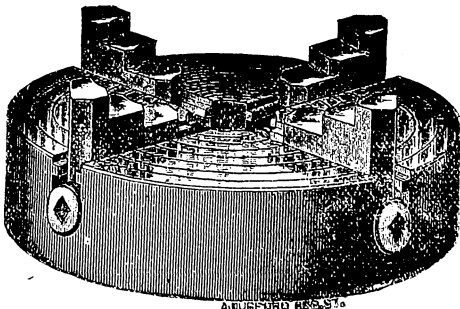
CUSHMAN CHUCKS.

We have recently improved our full line of Geared Scroll Chucks and have also added a 10½ inch and a 15 inch. Prices and discount on application.

Send for our catalogue of all kinds of Lathe and Drill Chucks.

The Cushman Chuck Co.,
Hartford, Conn.

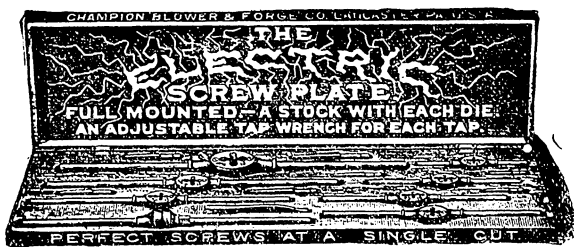
CHAMPION INDEPENDENT CHUCKS.



An entirely new line of small Chucks, provided with 3 or 4 independent reversible steel jaws. The best Chuck in the market for foot lathes. Ask your dealer for them or write to us.

THE D. E. WHITON MACHINE CO.
New London, Conn.

Sole European Agents **SELIG SONNENTHAL & CO.,** London.



Three styles of Screw Plates **BUILT ENTIRELY ON HONOR**, with prices to suit all. Write for catalogue.

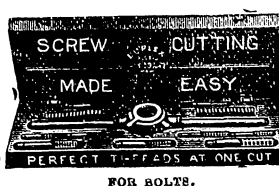
CHAMPION BLOWER & FORCE CO., - - - **LANCASTER, PA.**



THE ADJUSTABLE
"DUPLIX" DIE STOCK.

Quick. Accurate. Durable.
15,000 now in use.

HART MANUFACTURING CO.,
CLEVELAND, O., U. S. A.



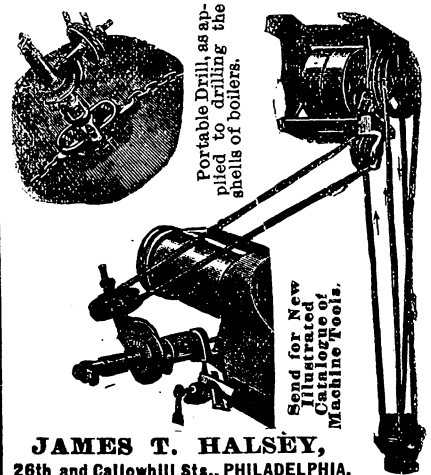
FRICITION CLUTCHES, SHAFTING, HANGERS, PULLEYS.

Sheaves for Rope Driving.
Gear Wheels.

FRICITION PULLEYS.

KEYSTONE CLUTCH AND MACHINE WORKS,

1708-1710 Germantown Ave.,
PHILADELPHIA, PA.



JAMES T. HALSEY,
26th and Callowhill Sts., PHILADELPHIA.

Portable Drilling Machines

Manufactured by

ALBERT M. COLBURN,

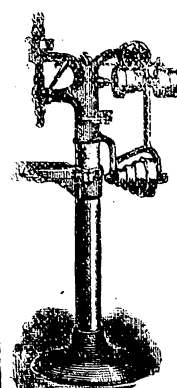
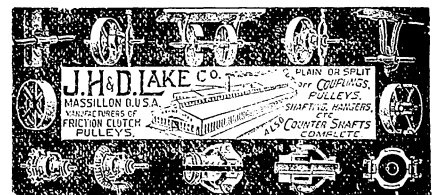
Wall St., New Haven, Conn.

SEND FOR CATALOGUE.

REECE'S PATENT HAND BOLT CUTTER OR SCREW PLATE.



Send for new catalogue of
SCREW CUTTING TOOLS.
EDWARD F. REECE, Mfr., GREENFIELD, MASS.



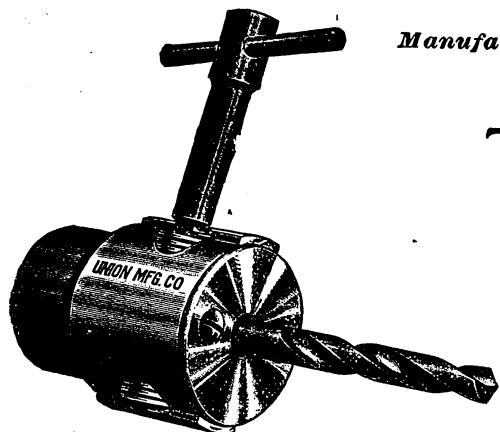
The Norton Drills

for light, sensitive and rapid drilling. 1, 2, 3, 4 or more spindles, sensitive or automatic feed. To drill from 0 to ¼ inch holes. The latest and best. Most convenient, sensitive and durable drills on the market. Have balanced spindles and balanced tables. Write for prices and description, or for special machinery.

THE
NORTON & JONES MACHINE TOOL WORKS,
PLAINVILLE, CONN.

UNION MANUFACTURING COMPANY, .: NEW BRITAIN, CONN.

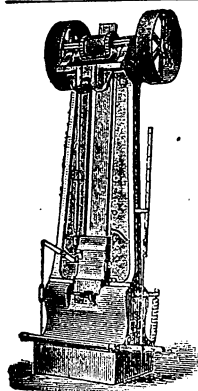
WAREHOUSE, 103 CHAMBERS ST., NEW YORK.



Manufacturers of Combination, Universal, Independent, and Combination Reversible Jaw Chucks.

THE UNION DRILL CHUCK.

NUMBER.	DIAMETER.	HOLDING.	LIST.
000	1 1/4 inches.	0 to 1/4 inch.	\$7.00
100	2 1/4 "	0 to 1/2 inch.	8.00
101	2 3/4 "	0 to 3/4 inch.	9.00
102	3 1/2 "	0 to 1 inch.	10.00



The Pratt & Whitney Co.,

HARTFORD, CONN., U. S. A.,

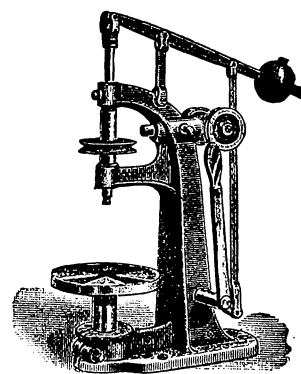
Manufacture machinery for general and special service in the manufacture of electrical apparatus, typewriters, bicycles, firearms, sewing machines and parts thereof.

Lathes, planers, shapers for tool making, milling, drilling, profiling, threading, drop forging and die sinking machines.

SHAFT CENTERING, SHAFT DRILLING, FLOUR MILL ROLL GROOVING, metal band sawing and brass finishing machinery, automatic grain scales.

Taps, dies, reamers, gauges, Renshaw ratchet drills, combination lathe chucks, boiler plate punches, standard measuring machines. Milling cutters in variety carried in stock and made to order. Gear wheels cut to order.

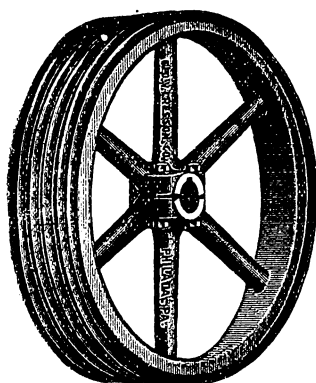
ASK FOR "HARDWARE CATALOGUE."



GEO. V. CRESSON CO.,

18th STREET AND ALLEGHENY AVE.

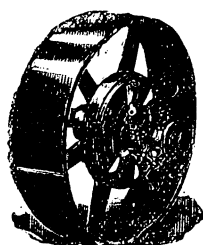
PHILADELPHIA, PA.



ROPE WHEELS,

All Diameters and Number of Grooves, for Manilla, Hemp, Cotton, or Leather Ropes.

The Moore & White Co.,

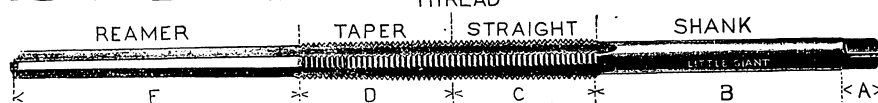


Clutch Pulley.

N. E. Cor. 15th AND LEHIGH AVE.,
PHILADELPHIA, PA.

Paper
Machinery,
Friction
Clutches, &c.

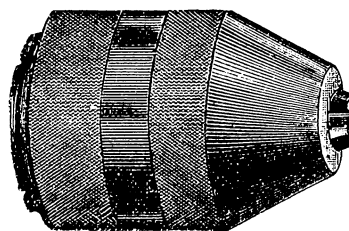
STAY BOLT TAPS.



We Make a Specialty of this Style of Tap.

CUT THIS OUT, mark Description of TAPS used and send to us for prices.

WELLS BROS. & CO, GREENFIELD, MASS., U. S. A.



THE NEW GIANT DRILL CHUCK.
Holds a Drill With the Grip of a Giant. All Steel
Parts Interchangeable.
SIMPLE IN CONSTRUCTION.

EASY TO TAKE APART AND CLEAN. BEST OF WORKMANSHIP AND VERY CHEAP. Manufactured and sold by

THE SMITH & EGGE MFG. CO., Bridgeport, Conn.

Wire Drawing Machines, WATERBURY

Gang Slitters,

MACHINE CO.,

Power Presses and Dies,

Waterbury, Conn.

Tumbling Barrels,

MANUFACTURERS.

Special Machinery.

Send For Prices.

BOOKS

THE NEWEST BOOKS ON Metal Working, Iron, Steel and Metallurgy; Mining, Mechanical and Civil Engineering; Casting and Founding; Electricity and Electric Lighting; Draftsmanship, Architecture and Building, promptly supplied on receipt of price. SEND FOR CATALOGUES, mentioning the kind of books you are looking for.

DAVID WILLIAMS, 96-102 Reade St., New York.

THE STANDARD TOOL CO., CLEVELAND, OHIO.

MANUFACTURERS OF

Increase Twist Drills, Reamers, Taps, Milling Cutters and Chucks.

Taper Shank
Drills,
St. Shank Drills,
Screw-driver
Bits,
Reamers,
Shell and Solid
Taper Reamers.



Bit Stock Drills for Metal or Wood.



Wood-Boring Brace Drills, will cut off nails.

Hand Taps,
Mach. Screw Taps
"Standard" Drill
Chuck,
"Ellenwood" Drill
Chuck,
Sq. Shank Drills
for Ratchets,
Twist Drills for
Blacksmiths'
Presses

Sockets for
Taper Shank
Drills.

Reamers in
all sizes.

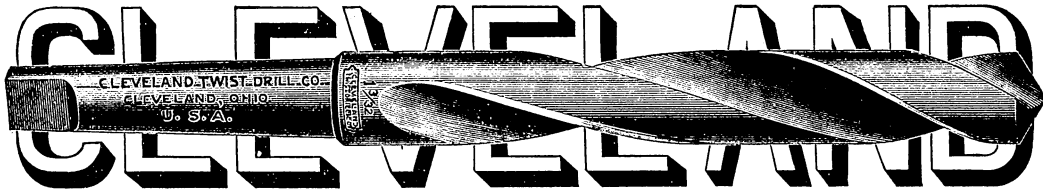
NEW YORK OFFICE, 33 CHAMBERS ST. Send for Catalogue.

1874.

OLD RELIABLE.

1894.

SEND
FOR
CATALOGUE



WRITE
FOR
DISCOUNTS.

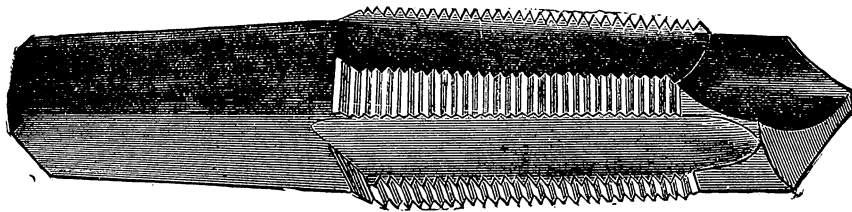
Our Drills are Hot Forged: The best part of the steel IS NOT CUT OUT and thrown away.



They are TOUGHER, STRONGER, BETTER than is possible to attain by milling. Catalogue and Discounts sent on application.

Morse Twist Drill & Machine Co., NEW BEDFORD, MASS.

STOW FLEXIBLE SHAFT,



The above cut shows a combined Tap and Drill and is used for tapping gas and water pipes.



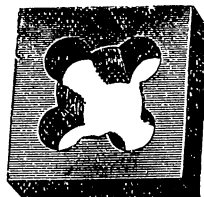
Manufacturers of Drills of all kinds, Reamers, Taps and Dies, and special tools to order.

MANNING, MAXWELL & MOORE,

Sole Sales Agents for THE MORSE TWIST DRILL AND MACHINE CO.'S



Manufacture of Patent Machine Relieved Nut, Hand, Blacksmith and Machine Screw Taps, Screw Plates, Tap Wrenches and Patent Relieved Pipe Taps and Pipe Reamers; also of Solid Bolt and Pipe Dies. Furnished in V, U, S. Standard and Whitworth shape of threads.



111 Liberty Street,

NEW YORK.

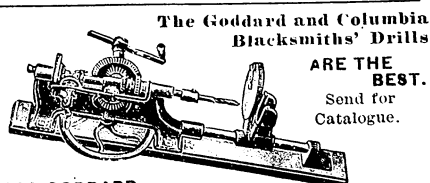
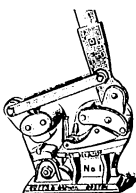
B. & O. SURE GRIP TIRE UPSETTER.

IT IS WITHOUT A FAULT. ONE
MOTION DOES IT ALL.

Every machine is tested and
warranted. Send for Price.

BUTTS & ORDWAY,

500 Atlantic Ave., Boston, Mass.



The Goddard and Columbia
Blacksmiths' Drills

ARE THE
BEST.

Send for
Catalogue.

ASA GODDARD,
Manufacturer,
Worcester, Mass.

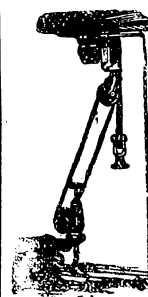
Invented and
Manufactured by
THE
STOW MFG. CO.,
Established 1875. Binghamton,
N. Y.
**PORTABLE,
DRILLING
TAPPING,
REAMING.**

General European Agents,

SELIG SONNENTHAL & CO.

85 Queen Victoria St.,

LONDON, ENGLAND.



Thos. H. Dallett & Co.

York St. and Sedgley Ave.,
PHILA.

MANUFACTURERS OF
Portable Drills, Hand
Drills, Boiler Shell Drills,
Electric Motors specially
adapted for driving Ma-
chine Tools, Cranes, Ele-
vators, Pumps, Presses and
other machinery.

Complete Power and Light
Plants Installed.

Stow Flexible Shaft Co., Limited,

26th, Callowhill & Biddle Sts
PHILA., PA.,

Manufacturers of

PORTABLE DRILLING,
TAPPING, REAMING
and BORING MACHINE

Also Tools for Emery Wheel
Grinding, Metal and Wood Pol-
ishing, Cattle Brushing; and
Clipping, &c.

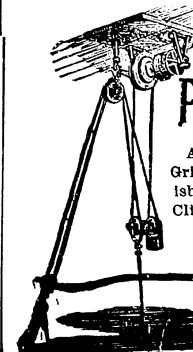
Gen'l European
Agents.

Bolling & Lowe,

2 Lawrence,

Pountney Hill.

LONDON, ENG.

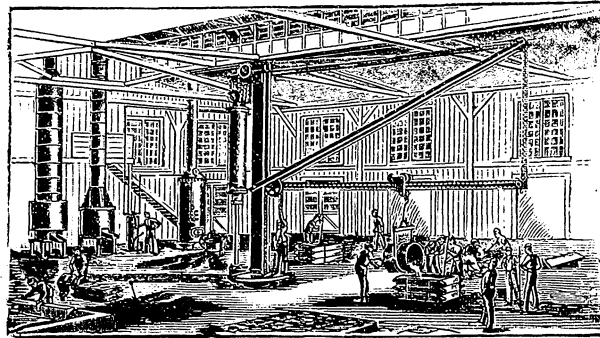


All We Ask.

USERS.

The Largest and Best Concerns.

Frazer & Chalmers.
Gaar, Scott & Co.
J. I. Case Threshing Machine Co.
Colorado Fuel & Iron Co.
Solid Steel Co.
Sterling Boiler Co.
Otis Bros. & Co.
Geo. V. Cresson Co.
Pittsburgh Steel Casting Co.
Eynon-Evans Mfg. Co.
Harrison Safety Boiler Co.
Hoopes & Townsend
Hughes & Patterson.
Shickle, Harrison & Howards Iron Co.
Rensselaer Mfg. Co.
Buffalo Cast Iron Pipe Co.
Buffalo Furnace Co.
National Pipe & Foundry Co.
John Brennan & Co.
Murray Iron Works.
Danville Foundry & Machine Co.
Sears & Nicols.
Moore & Brady.
Pearson & Co.
Morton Reed & Co.
Benj. Atha & Illingworth Co.
Montgomery Furnace Co.
John Q. Denny.
I. G. Johnson & Co.
Canda Mfg. Co.
Crane & Breed Mfg. Co.
Diamond State Iron Co.
Hartman Mfg. Co.
Blankley Bros. & Co.
Port Henry Furnace Co.
Wm. L. Bailey & Co.
Akron Iron Co.
And others.



5-ton Ridgway Crane in Foundry Diamond State Iron Co., Wilmington, Del.

IDEAL CRANE FOR FOUNDRY OR MILL.

Rapid, Safe, Sure and not costly. No pumps, no accumulator, no shocks, no bother with valves and packings. None of that awful waste of power. No freezing. No bother of any sort.

Attached to any steam supply is ready for business at once. Uses so little steam it is never missed. No special operator required. Absolutely safe. Being balanced it is easy on buildings. Sets indoors or outdoors. So cheap any plant can use it. Earns its cost always in a few months.

The best concerns everywhere are getting them. Look each side of you. Some have eight or nine or more of them. They save dollars in handling goods; that's the reason. Does the work while other cranes are getting ready to do it.

We make many styles—also Elevators.

SEND FOR CIRCULAR.

CRAIG RIDGWAY & SON,
COATESVILLE, PA.

USERS.

The Largest and Best Concerns.

Penna. Steel Co.
Illinois Steel Co.
National Tube Works Co.
Phoenix Iron Co.
Henry Disston & Sons Co.
A. & P. Roberts Co.
Catasauqua Mfg. Co.
Mahoning Rolling Mill Co.
Harrisburg Rolling Mill Co.
New Phila. Iron & Steel Co.
Old Dominion Iron & Steel Co.
Standard Iron Co.
Cambria Iron Co.
Johnson Co.
Norristown Steel Co.
Midland Steel Co.
Kellogg Seamless Tube Co.
American Steel Wheel Co.
Benwood Steel Co.
Bellaire Nail Works
Oliver Iron & Steel Co.
Jones & Laughlin.
West Superior Iron & Steel Co.
Nova Scotia Iron & Forge Co.
Reading Iron Co.
Spang Steel & Iron Co.
Apollo Steel & Iron Co.
Glasgow Iron Co.
Harrisburg Car Co.
Atlantic Refining Co.
W. W. Kurtz & Sons.
Kilmer Mfg. Co.
J. W. Friend & Co.
American Wire Nail Co.
New Haven Wire Co.
E. & G. Brooke Iron Co.
Passaic Rolling Mill Co.
Moorehead-McCleane Co.
And others.

SELL THE BEST.



**THE "SURE GRIP"
Steel Tackle Block**

is taking the place of all other hoisting blocks.

Send for catalogue and discount

Fulton Iron & Engine Works.
28 Brush St., Detroit, Mich.
ESTABLISHED 1852.

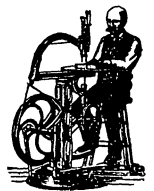
Foot & Hand Power Machinery.

Screw Cutting Lathes, Wood Turning Lathes, Scroll Saws, Circular Saws, Moulders, Mortisers, Etc.

Strictly High Grade. Catalogue Free.

SENECA FALLS MFG. CO.,
255 Water St., Seneca Falls, N. Y., U. S. A.

London Agency, MESSRS. CHAS. CHURCHILL & Co., 21 Cross St., Finsbury, London, E. C., England.



BORING AND TURNING MILLS,

UNIVERSAL, RADIAL AND UPRIGHT DRILLS,
ALL SIZES.

BICKFORD DRILL & TOOL CO.,
10 Lawrence Street, Cincinnati, O.

Highest Efficiency.

**WESTON'S NEW
TRIPLEX
Chain Block**

far exceeds all predecessors. Send for Prof. Thurston's report of comparative tests of all chain pulley blocks.

The Yale & Towne Mfg. Co.
STAMFORD, CONN.
New York, 84-86 Chambers St.
Chicago, 152-154 Wabash Ave.
Philadelphia, 1120 Market St.
Boston, 224 Franklin St.

BORING AND TURNING MILLS,

UNIVERSAL, RADIAL AND UPRIGHT DRILLS,
ALL SIZES.

BICKFORD DRILL & TOOL CO.,
10 Lawrence Street, Cincinnati, O.

ISRAEL H. JOHNSON, JR. & CO., - PHILADELPHIA.

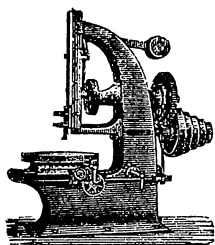
J. A. FAY & CO.,
288 to 308 W. Front St., Cincinnati, Ohio, U. S. A.

ORIGINATORS, INTRODUCERS AND CONSTRUCTORS OF
WOOD-WORKING MACHINERY
Of Every Description.

We captured all the "Honors" at the World's Fair for superiority.

Machines for any Want Supplied.
Largest Line in the World.

Engine Room Chat. By ROB. GRIMSHAW. This little book presents in colloquial style ideas which appeal to all interested in the generation of power, more particularly those charged with the care of engines and boilers and their appurtenances. 148 pages, cloth.....\$1.00
For sale by DAVID WILLIAMS, 96-102 Reade st., N Y

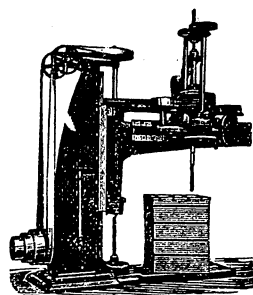


William Sellers & Co., Incorp.

PHILADELPHIA, PA.,

—MANUFACTURERS OF—

Improved Machine Tools for Working Iron and Steel,
High Speed Power Traveling and Swing Cranes,
Injectors, Locomotive Turn Tables, Shafting, &c., &c.
Testing Machines, under patents of A. H. Emery.
Prices, Descriptive Matter, &c., Furnished on Application.



**MORSE,
WILLIAMS
& CO.**

Morse Elevator Works.

MANUFACTURERS AND BUILDERS OF
ELECTRIC, HYDRAULIC, BELT and HAND
POWER PASSENGER and FREIGHT
ELEVATORS.

1105 Frankford Ave., Philadelphia. 108 Liberty St., New York.
1116 E. St., N. W., Washington, D. C. 33 Lincoln St., Boston.
425 Spruce St., Scranton, Pa. 82 Church St., New Haven.
Omaha Building, Chicago, Ill.



Maris & Beekley.
PHILA., PA.

MANUFACTURERS OF
CRANES,
Power Bridge
Cranes, Hand
Bridge Cranes,
Jib Cranes.

Portable Hoist.
Holds load at any
point.

Overhead Track,
Trolleys,
Switches.

FAIRMOUNT MACHINE CO.,

(Successors to Thomas Wood & Co.)

Twenty-second and Wood Sts., Philadelphia, Pa.

Shafting, Gearing, Self-Oiling Bearings, Friction Pulleys, Elevators.

Rope Transmission; Sheave Wheels, any size required, for Hemp, Manila and Cotton Rope Driving. Looms, Cotton and Woolen Machinery for Winding, Spooling, Reeling, Beaming, Warping, Dyeing, Sizing, Scouring &c.

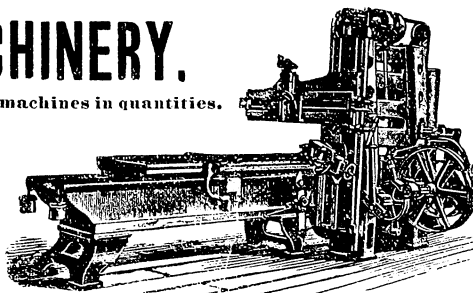
OPEN SIDE PLANERS.

READY FOR IMMEDIATE DELIVERY.

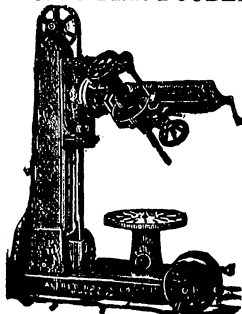
SPECIAL MACHINERY.

We will take pleasure in estimating on machines in quantities.

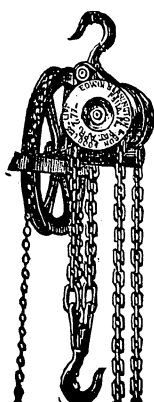
DETRICK & HARVEY
MACHINE CO.,
MANUFACTURERS,
BALTIMORE, - - MD.



Alfred Box & Co.,
Front, Poplar and Canal Sts., Philadelphia.
SOLE MANUFACTURERS OF
BOX'S PAT. DOUBLE SCREW HOISTS



25,000 supplied in the United States exclusive of foreign trade; a record that tells its own story; a record of solid, substantial growth; extensive new works necessary to keep up with orders in our specialties; ample room now to build the heaviest class of Traveling and Jib Cranes of all sizes, Overhead Railways, Trolleys, Special Hoisting Gear for home-made Cranes; also our Patent Radial Drills and Gang Drills, as used by bridge builders. Estimates furnished with photos. Correspondence solicited, or visit our works.



**E. Harrington, Son
& Co., Incorporated.**

ESTABLISHED 1867.

MANUFACTURERS
Engine Lathes, Drills, Planers, &c.
Double Chain Screw Hoists
Geared Travelers and
Turntables.
Gear Cutting a Specialty.

1508 Pennsylvania Ave.,
Philadelphia, Pa.



J. G. SPEIDEL,
807 & 809 CHERRY STREET,
READING, PA.

Patentee and Manufacturer of the celebrated

Economic Safety Hoist.

500 to 30,000 Lbs. Capacity.
Has been awarded the John Scott Medal and Premium by the Franklin Institute of the City of Philadelphia for Highest Efficiency, Simplicity and Durability.

One man can lift two to three times as fast as with any other self-holding chain hoist. It has two speeds, is built strong and durable, and guaranteed to give satisfaction.

TRAVELING AND SWING CRANES up to 30,000 lbs. capacity and 50 ft. span. Overhead Framway, with Trolleys, Switches, &c. Elevators and Special Hoisting Machinery. Illustrated Cat. and Prices on application.



Moore Mfg. & Fdry. Co.,

Milwaukee, Wis., U. S. A.,

Manufacturers of

Moore's Anti-Friction

Differential

Chain

Pulley

Block.

A New Movement!
A Perpetual Compound Lever!
Powerful, Simple and Durable!

One Man Can Lift to the Full Capacity of the Block.

Self-Sustaining at Any Point.

The Block Always Hangs Plumb.

Send for descriptive price list, mentioning this paper.

A POINTER

That will Save you Freight.

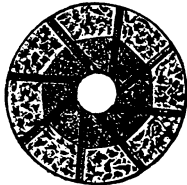
We keep in stock a complete assortment of everything in the Grindstone line at our branch yards,

Chicago, Ill.; South Boston, Mass.; 283 Front St., New York, N. Y.

THE CLEVELAND STONE CO.,

Patent ROCK EMERY MILL STONES.

Next to
Diamonds
in
Hardness
and
Durability.

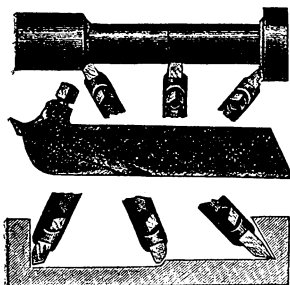


Made to
Fit Any
Mill Frame
without
change.

Cuts every substance with unexampled rapidity; always sharp; emery face Never Dressed. As much more Durable than other stones as they are Harder. Never Glaze; grind everything. Most Rapid Grinder known.

Send for Circular.

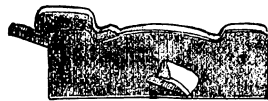
STURTEVANT MILL CO., Boston, Mass.



The Armstrong Tool Holder. For General Lathe and Planer Work. A practical substitute for Forged Tools. Saves forging, dressing, and tempering. 70 per cent. grinding, 90 per cent. tool steel. Over 10,000 now in use by such firms as J. A. Fay & Egan Co., Frick Co., Morris Machine Works, W. F. Callahan & Co., Walburn.

Patented February 28, 1893.

Swenson Co., Fitchburg Machine Works, Lodge & Shipley Machine Tool Co., and many other large concerns. Seven Sizes, suitable for all kinds of work. Tools sent on trial to responsible parties. Manufactured only by Armstrong Bros Tool Co., 78-78 Edge-wood Ave., Chicago.



J. Popping's
Patent Machine
and Tool Wks.

MANUFACTURERS OF
Solid Iron Shoulder Rabbet Planes, etc., etc., and
Hofstatter's Patent Hair Picking Machine.
N. E. Cor. 58th St. and 11th Ave., N. Y.



The Scattergood
Time Record and
Pay Roll Book.
(Pat. Oct. 13, 1891.)
Address for Circular to
HENRY W. SCATTERGOOD.
23 Richmond St., Phila., Pa.

SPECIAL

And Automatic Machinery and Tools for reducing cost of manufacturing machines, parts of machines, articles of hardware, &c., designed and built. Tools, models and experimental work. Estimates given. Correspondence solicited.

IDEAL MACHINE WORKS,
P. O. Box 655 Hartford, Conn.

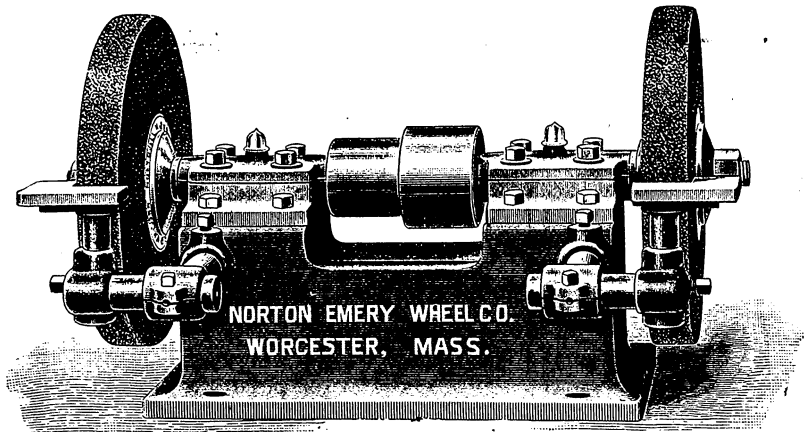
WORK! WORK!! WORK!!!

We want contracts to build

Special Machinery.

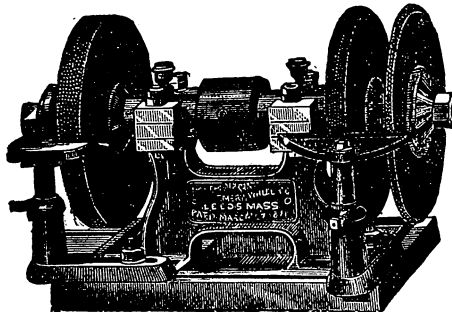
Write for our estimate on any work you want, or we will make sketches and designs without charge.

THE L. E. RHODES CO., Hartford, Conn.



Norton Emery Wheel Co.
Send for Catalogue

Worcester Mass



ESTABLISHED 1867. CAPITAL \$100,000

Northampton Emery Wheel Co.,
LEEDS, MASS.

And 20 South Canal St., Chicago,

MANUFACTURERS OF

EMERY WHEELS

—AND—
EMERY WHEEL MACHINERY

Of Best Quality.

Send for Catalogue. FACTORY AT LEEDS, MASS



THE Bennett Emery Wheel Dresser
Does the best work, does it easy, quick and the most for the least money. Manufactured by **Bay State Stamping Co.,** 17 Hermon Street, Worcester, Mass.

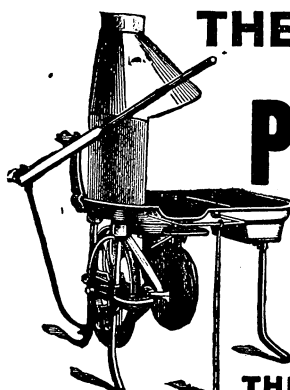
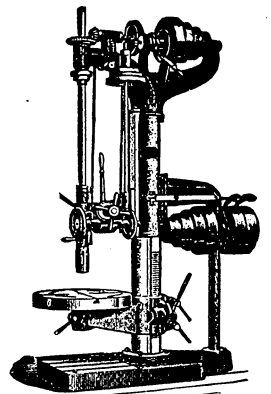
THE Tool Room

Or Machine Shop without proper machinery for keeping old tools in repair and the making of new ones cannot hope to succeed. The Hamilton Drill Press is a necessary adjunct to all such, because it does all that a tool of this kind can do, and besides, it's built on honor.

THE HAMILTON MACHINE TOOL COMPANY,

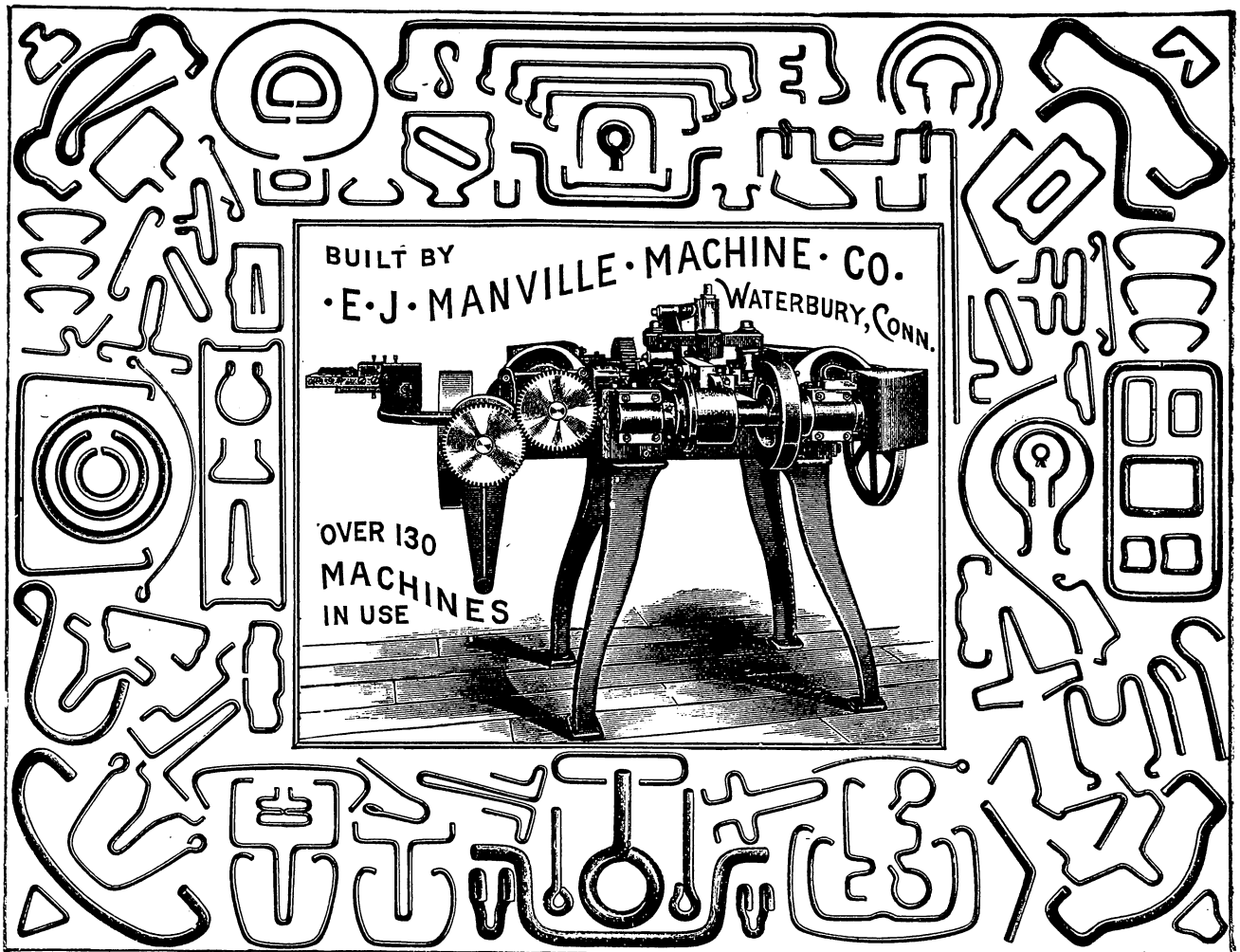
WEST MARKET STREET,

Hamilton, - Ohio, U. S. A.



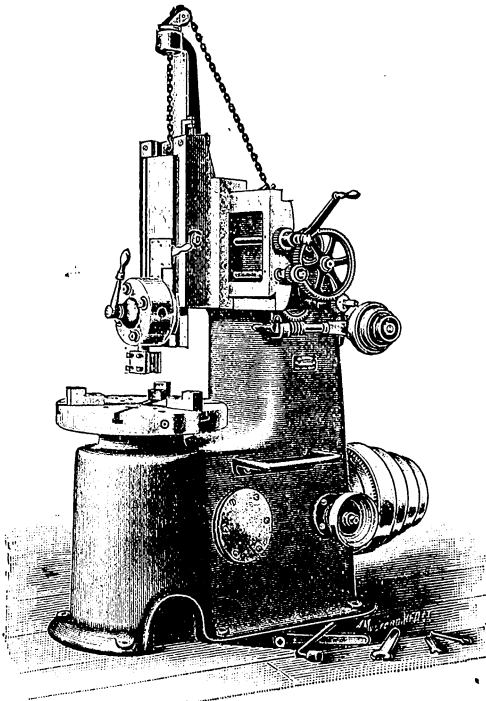
THE CYCLONE PORTABLE FORGES

Have Double Ratchet, Solid Frame, Adjustable Legs, Detachable Lever. Run Lightest, Make Strongest Blast & Last Longest. ALL DESIRABLE STYLES AND SIZES. Sold by Hardware and Machinery Dealers everywhere. Send for Catalogue of these and Hand & Power Blower, Blacksmith Drill Presses, &c.
THE FOOS MFG. CO. SPRINGFIELD, OHIO.



SOMETHING NEW.

30 Inch Vertical Chucking and Facing Machine, with Back Gears.



Capacity, 30 inches in diameter and 14 inches in height, under the rail.

Table is 24 inches in diameter and has a universal chuck.

Feeds are automatic in all directions and are provided with trips.

Countershaft has one 16-inch and one 20-inch pulley, giving 16 changes of speed, 8 with cone and 8 with back gears.

Let Us Send More Complete Information.

BRIDGEPORT MACHINE TOOL WORKS,

E. P. BULLARD Prop., - Bridgeport, Conn.

N. Y. OFFICE, 39 Cortlandt Street, Room 86.

FOR SALE. SECOND-HAND IRON PLANERS

Of Modern Style.

FIRST-CLASS ORDER.

WILL BE SOLD LOW

IF ORDERED AT ONCE
BEFORE REMOVAL.

16 in. wide,	18 in. high,	4 ft. long.
20 " "	20 " "	4 " "
22 " "	22 " "	6 " "
24 " "	24 " "	4 " "
25 " "	25 " "	8 " "
26 " "	26 " "	8 " "
30 " "	30 " "	10 " "
30 " "	30 " "	6 " "
32 " "	32 " "	10 " "
36 " "	36 " "	10 " "
36 " "	36 " "	16 " "

We also have the entire equipment of a large Engine and Boiler shop to dispose of, consisting of

LATHES, 14, 20, 24, 32, 52 and 84 in. swing.

UPRIGHT DRILLS, 20, 24, 40 and 68 in. swing.

RADIAL DRILL, 104 in., complete.

SHAPERS, 9, 15, 16 and 20 in. stroke

SCREW AND MILLING MACHINES.

SLOTTERS AND PUNCH PRESSES

STEAM HAMMERS AND BOLT CUTTERS.

BOILER ROLLS, PUNCHES, RIVETERS.

J. J. McCabe,

14 Dey Street, - New York.

Successor to E. P. BULLARD'S N. Y. Machinery Warerooms.

New and Second-Hand Machinery.

164 in. x 16 ft. Engine Lathe. Second-hand.
126 in. x 13 ft. Lowell Lathe.
120 in. x 12 ft. Hubbard Lathe. Compound Rest. Power Feed. New.
120 in. x 8 ft. Gleason Lathe. Second-hand.
118 in. x 6 ft. Pond Lathe. Second-hand.
117 in. x 6 ft. Putnam
216 in. x 6 ft. Davis Lathes. New.
216 in. x 8 ft.
113 in. French Turret Lathe. New.
130 in. x 30 in. x 8 ft. Davis Planer. New.
124 in. x 24 in. x 8 ft.
122 in. x 22 in. x 5 ft. Putnam Planer. Second-hand.
120 in. x 20 in. x 5 ft. Putnam Planer. Second-hand.
113 in. x 8 in. x 3 ft. Planer. Second-hand.
180 in. Radial Drill Press. New.
128 in. New Haven Drill Press. Power Feed. Second-hand.
232 in. B. G. & P. F. Davis Drills. New.
225 in. B. G. & P. F.
620 in. Davis Standard Drills. New.
320 in. " B. G. Drills.
1020 in. " Combined Wheel and Lever Drills. New.
216 in. Sensitive Drills. New.
1 Brown & Sharpe Heavy Milling Machine. Second-hand.
1 1/2 in. Bolt Cutter. Second-hand.
1 No. 1 Garvin Milling Machine. Second-hand.
33 in. Davis Cutting-Off Machine. New.
1 1/2 in. Davis Cutting-Off Machine. New.
This list will be changed each week.

W. P. DAVIS

Rochester, N. Y.

WANTED

Purchasers for the following.
70 Horse High Speed Automatic Engine, new; suitable for electrical work or power purposes.
24 inch swing, 25 foot Bed Engine Lathe, used about 18 months.
15 Horse Horizontal Slide Valve Engine, nearly new.
15 Horse Greenfield Vertical Engine.
No. 6 and No. 2 Roots' Pressure Blowers.

COOKE & CO.,

163 and 165 Washington St., New York.

FOR SALE.

Wright Automatic Engine, 16 in. x 32 in.
Ball Electric Light Engine, 13 in. x 1 in., 100 H.P.
F. McSWEGAN & SONS,
Dover St. and Franklin Square, N. Y.

BARGAINS IN SECOND-HAND BOILERS.

Good for 100 lbs. Pressure and upwards in the Hartford Boiler Inspection Co.

Eight 50 to 70 H.-P. Locomotive Boilers, 54 in. x 15 ft., 123 2/4 in. Tubes, built 1/4 in. steel.
Ten 100 H.-P. Vertical Boilers, 60 in. x 16 ft., 162 2 in. Tubes, built 1/4 in. and 3/4 in. steel.
Two 40 H.-P. Vertical Boilers, 48 in. x 10 ft., 120 2 in. Tubes, built 5-16 in. steel.
Boilers are complete with a full equipment of fittings. Will sell at lowest prices.

L. F. SEYFERT'S SONS,

437-441 N. 3d St., Philadelphia, Pa.

SECOND-HAND MACHINERY.

14 in. x 6 ft. Fitchburg Engine Lathe.
14 in. x 8 ft.
21 in. x 14 ft.
15 in. x 8 ft. Plain Turning Engine Lathe.
24 in. x 12 ft. Chamberlain Engine Lathe.
9 in. New York Steam Engine Co. Shaper.
8 in. Niles Semi-Universal Radial Drill.
9 in. Niles Slotting Machine.
60 in. Niles Pulley Rorer.
60-96 in. Niles Pulley Lathe.
4 ft. 3/4 in. Betts Mch. Co. Hand Boiler Rolls.
8 ft. 3 in. " " Power " "
8 ft. Morgan, Williams and Co. Power Boiler Rolls.
No. 37 Morgan, Williams and Co. Comb. Punch and Shear.
20 in. throat Betts Machine Co. Double End Punch and Shear.
25 in. x 25 in. x 5 1/2 ft. Hubener Screw Planer.
51 in. x 45 in. x 15 1/2 ft. New Haven Planer.
All in good order.

Also 600 new and second-hand tools in stock. Send for list.

PRENTISS TOOL & SUPPLY CO.,

115 Liberty Street, NEW YORK.

59 South Canal Street, CHICAGO, ILL.

FOR SALE.

Engines with Cylinders 26 in. x 48 in. and smaller.
Portable, Tubular and Vertical Boilers of all sizes.
13 2-yard 3-ft. gauge all around Dump Cars.
7 Narrow Gauge and 2 Standard Gauge Locomotives.
1 Large Worthington Duplex and other Pressure Pumps. New and Second-hand.
Hoisting Engines and Grinding Pans.
Rail, Sheet and Clipping Shears.

THOMAS CARLIN'S SONS,
Allegheny, Pa.

PLANER, 24 in. x 24 in. x 8 ft., table. Good order \$185.00
33 in. x 24 ft. Bk. Gd. Sc. Cut'g Rebuilt Lathe. 650.00
No. 1 Dallett Portable Drill. Good as new..... 90.00
38 in. Bk. Gd. Drill, heavy Good as new..... 275.00
21 1/4 in. Heavy Lever Feed Drill. New..... 50.00
Forging Drop, 100-lb. Hammer, New Design... 180.00
Wire Straightener and Cutter, Semi-Aut..... 60.00
Bolt Cutter, New Head and Dies, 3/4 to 1 1/2 in. 175.00
Power Punch Presses..... \$75.00 and upward.

AMER. TOOL WORKS. Cleveland, O.

FOR SALE.

2 Double Deck Boilers about 40 H.-P. each, cheap. Hoisting Engine. Cylinder Boilers for Stacks, 30, 36 and 42 in. diameter. Round and Square Iron Tanks. Blow Offs. 5 Brass Cannons about 1400 or 1500 pounds each. Good order. All kinds of Scrap Iron and Metals on hand.

BUSSENIUS & CUNLIFFE,
12th and Washington Ave., Philadelphia.

WANTED.

Wrought and Steel Scrap, Boiler Plate, Cast Machinery Scrap, Stove Plate and Burnt Iron.

JOHN W. SWANGER & CO.,

Crum Lynne, Pa.

FOR

MACHINERY

ADDRESS US.

Pennsylvania Mch. Co., Ltd.,

PHILADELPHIA, PA.

Machinery,

New and Second-Hand, For Sale.

93 in. Hydraulic Riveter, No. 12 Turret Machine.
Pump, Accumulator, Jones & Lamson.
Traveling Crane. 100 in. Swing Engine
No. 2 Plate Planer, 16 1/2 ft. Lathe, 20 ft. Bed.
one setting up to 1 inch 51 in. Swing Engine Lathe.
Plates. 18 ft. Bed.
No. 27 Shear, 30 1/2 in. throat, cuts 3/4 in. Plate. 32 in. Swing Engine Lathe.
All the above are New; 16 ft. Bed.
Bement, Miles & 25 in. Swing Engine Lathe.
Co. make. 16 ft. Bed.
Power Bending Rolls, 8 ft. 24 in. Swing Engine Lathe.
3 in. between Housings. 25 ft. Bed.
Other sizes, different lengths Beds.
PLANERS. Drill Presses, Radial Drills,
72 in. x 60 in. x 24 ft. 4 Gang Drills, Mill'g Mch.
Heads. 60 in. x 60 in. x 16 ft. 2 No. 1 and 3 Univ. Millers,
Heads. B. & S. Allen Pneumatic
69 in. x 52 in. x 15 ft. 1 Riveter for Bridge work.
Head. Bolt Cutters 14, 1 1/2 & 2 in.
30 in. x 30 in. x 12 ft. 1 14 1/2 x 15 Phoenix Aut. Eng.
Head. 13 x 12
Other sizes smaller. 13 x 18 N. Y. S. E. Co.
36 x 36 x 16 ft. Gray Co. 10 x 12 Slide Val. Hor. Eng.
Switch Planer, 2 Heads, Blake Duplex Compound
Good as new. Pumps, &c.

Send For Latest List.

Geo. Place Machine Co.

Warehouse, 511 & 513 West 13th St.
Office, 120 Broadway, New York.

32-INCH UPRIGHT DRILL PRESS.

TWO OF THEM; SECOND HAND.

Makers' Name, KERKHOFF & CO.
Height, 8 ft. 2 in.
Greatest Distance Spindle to Base Plate, 52 in.
Greatest Distance Table to Spindle, 38 in.
Weight complete, 2600 lbs.
Back Geared and Power Feed, Quick Return, Balanced Spindle; Shafts and Studs made of Steel.

THE SCRANTON SUPPLY & MACHINERY CO.,
SCRANTON, PA.

For Sale, Very Low for Cash.

500 tons Relaying Steel Street Rails, side bearing, 35 to 47 lb. sections. Also 65-lb. Steel T's.

WM. H. PERRY & CO., Providence, R. I.

SEE HERE!

1 each Garvin No. 2 and No. 4 Milling Machines, 2d hand
1 Pratt & Whitney Lincoln Miller No. 3, 2d hand.
1 Muller 16 x 6 Engine Lathe, 2d hand.
30 in. Henley Pulley Lathe, 2d hand.
1 Lodge & Davis 17 x 6 Engine Lathe, 2d hand.
1 Pratt & Whitney 19 x 6 Engine Lathe, 2d hand.
1 Lodge & Davis, 21 x 8 Engine Lathe, 2d hand.
1 Dietz Gang 22 x 8 Engine Lathe, 2d hand.
1 New Haven 28 x 8 " "
1 Dietz Gang 80 in. Radial Drill, " "
1 20 in. Lever Drill, new.
1 each Lodge & Davis 15 in. and 20 in. Shaper, new.
1 26 in. Triple Geared Shaper, new.
1 Gear Cutter, will cut up to 40 in., 2d hand.
1 Baker Bros. Universal Saw bench, new.
A full line of the most improved Turret Lathes, and Pulley Machinery, also Motor Gear Cylinder Boring and Triple Facing Machines.

THE LODGE & SHIPLEY MACHINE TOOL CO.,
107-113 Culvert St., Cincinnati, Ohio.

For Sale Cheap.

Special lot of
NEW ENGINE LATHES,

13 in. x 5 ft. 17 in. x any length bed.
15 in. x 6 ft. 27 in. x any length bed.
27 in. x 12 ft. 30 in. x any length bed.
32 in. x 12 ft. 32 in. x any length bed.

ADDRESS

Draper Machine Tool Co.,

Successors to

LATHE & MORSE TOOL CO.,

130 Gold Street,

WORCESTER, MASS.

BARGAINS.

24 x 48 Miller & Allen Corliss Engine.
16 x 36 Slide Valve Engine.
16 x 24 " " " New.
15 x 30 " " " "
15 x 18 " " " "
14 x 30 " " " "
12 x 20 " " " New.
14 x 20 Vertical " "

A large number of new and second-hand Boilers, Engines, Lathes, Planers, Shapers, Millers, &c., in stock.

Write us for what you want and we will give you prices and full information.

LOVEGROVE & CO.,
Third and Quarry Sts., Phila., Pa.

SECOND-HAND MACHINERY.

One Fifield Screw Cutting Engine Lathe, 30 in. swing on 16 ft. bed, with blocks to raise same to swing 47 in.
One Fifield Screw Cutting Engine Lathe, 38 in. swing on 14 ft. bed.
One Pratt & Whitney 36 in. Gap Chucking Lathe.
One Pease Planer, 24 in. x 24 in. x 6 ft.
One Iron Planer, 52 in. wide, 44 in. high, 12 ft. long, with two heads on the cross rail.
One L. W. Pond Gear Cutter, to cut gears 36 in. diameter, 5 in. face, also arranged for cutting bevels.

HILL, CLARKE & CO.,
156 Oliver St., Boston, Mass.
12 and 14 South Canal St., Chicago, Ill.

SECOND-HAND MACHINE TOOLS.

ENGINE LATHES.

1 14 in. x 6 ft. Bogart.
1 15 in. x 5 ft. Flather.
1 15 in. x 6 ft. Blaisdell.
1 15 in. x 8 ft. Pitchburg.
1 16 in. x 7 ft. Bement.
1 16 in. x 6 ft. F. E. Reed.
1 16 in. x 6 ft. Perkins.
1 18 in. x 8 ft. Wm. Munzer.
1 20 in. x 6 ft. Bullard.
1 26 in. x 10 ft. New Haven.
1 26 in. x 25 ft. L. W. Pond.
1 34 in. x 20 ft. Perkins.

PLANERS.

1 16 in. Lathe & Morse.
1 16 in. x 16 in. x 3 ft.
1 22 in. x 22 in. x 4 ft.
1 28 in. x 28 in. x 7 ft.
1 34 in. x 20 ft. Perkins.

DRILL PRESSES.

1 10 in. Barnes Friction Disc.
1 13 in. Burnham Sensitive.
2 No. 2, 4-Spindle Garvin.
1 No. 4, 6-Spindle Garvin.
1 3-Spindle Pratt & W.
1 24 in. Cincinnati.
1 34 in. Putnam, Heavy.
1 5 ft. Niles Univ. Radial.

SHAPERS.

1 10 in. Boynton & Plummer.

Also a large number of other machines. Write for complete list and detailed description.

THE GARVIN MACHINE CO.,
Laight & Canal Sts., New York.

FOR SALE.

One 25 H.-P. Otto Gas Engine in first-class condition. Can be bought very reasonable.
BIRMINGHAM IRON FOUNDRY,
Birmingham, Conn.

Shears, Punches, &c.

1 Newbold Rotary Shear, cuts $\frac{1}{4}$ in. thick.
1 Hilles & Jones Angle Shear 5 in.
1 Alligator Shear, cuts $\frac{1}{4}$ in. rounds.
1 Bisbee Punch or Shear, 30 in. throat.
1 Alligator Shear, 15 in. knives.
1 Flange Punch, 24 in. throat.
1 No. 3 Styles & Parker Punch.
1 No. 2 $\frac{1}{4}$ Schlenker Bolt Cutter.
1 Betts Boiler Punch, $\frac{1}{4}$ in. x $\frac{1}{2}$ in.
1 Nail Plate Shear.
5 Wire Nail Machines, 4 sizes.
Send for details and prices.

THOS. P. CONARD,

206 Walnut Place, Philadelphia.

SECOND-HAND MACHINERY.

9 ft. x 11 ft. Scotch Boiler, 110 lbs. Steam.
8 ft. x 4 ft. Marine Tyne Boiler, 00 lbs. Steam.
Knowles Independent Condenser for 350 H.-P. Barr
Surface Condenser for 300 H.-P. " 250 H.-P.
Deane Fire Pump, 14 x 7 x 14.
Davidson Pumps, 10 x 12 x 24.
Brass Fitted 10 x $\frac{1}{4}$ x 16.
14 x $\frac{1}{4}$ x 14.
12 x 10 x 12.
Guld & Garrison Tank Pump, 24 x 22 x 24.
Compound Duplex, 14 and 20 x 5 x 15.
" 10 " 16 x 10 $\frac{1}{4}$ x 10.
" 7 " 18 x 7 x 8.
#0 Ton Flywheel, 23 ft. dia.
Scow, 70 ft. x 23 ft. x 6 ft. hold.
Hydraulic Elevator. Whittier. Cylinder 6 in. x 6 ft.
Gear 10, 1 Car, travels 60 ft. All complete.

MARVIN BRIGGS, 12 Broadway, N. Y.

Three 100 H.-P. Armstrong & Sims Automatic Engines.
One 150 H.-P. Ide Automatic Engine.
One 81 " Beck.
One 60 " Westinghouse Automatic Engine.
One 45 " "
Two 150 H.-P. Phenix Automatic Compound Engines.

All in first-class order and cheap.

FRANK TOOMEY,

181 N. Third St., Philadelphia, Pa.

Second-Hand Rails FOR SALE.

In lots to suit, and ready for delivery.

3000 tons 60 lb. Steel T Rails.
450 tons 56 lb. Steel T Rails.
800 tons 54 lb. Steel T Rails.
400 tons 50 lb. Steel T Rails.
350 tons 40 lb. Steel T Rails.
50 tons 35 lb. Steel T Rails.
500 tons 35 lb. Iron T Rails.
250 tons 30 lb. Iron T Rails.
120 tons 30 lb. Steel T Rails.
160 tons 25 lb. Iron T Rails.
140 tons 20 lb. Steel T Rails.
60 tons 16 lb. Steel T Rails.
1700 tons Johnson Girder Rails, 38, 48, 52 and 66 lb. Rails.

All selected and in excellent condition for relaying and only slightly worn.
Second hand selected and sound rails furnished in specified lengths for builders' use. For prices and particulars apply to

JOSEPH JEWKES,
Railway Equipment, Pittsburgh, Pa.

AT ALL TIMES

we have on hand Steam Pumps, Second-hand and New. Every Second-hand pump is tested and guaranteed before leaving shop. Write us for information, also for catalogue, circulars, prices, etc., of the celebrated "Hooker Patent Steam Pump," which we manufacture.

HOOKE-COLVILLE STEAM PUMP CO.,
St. Louis, Mo.

SOME BARGAINS HERE.

1 Hendey Shaper, 15 in. stroke, imp. vise.
1 14 x 6 Screw Cutting Engine Lathe. New.
1 5 in. hole in Turret Screw Machine and Counter, \$25
2 $\frac{1}{4}$ Hendey Cutting-off Machine. New.
1 3-Spindle Garvin Drill Press, used 1 month.
100 H.-P. Woodbury Engine. 2d-hand. Good order.
2 50 H.-P. Woodbury Boilers. Good order.
2 75 H.-P. Woodbury Boilers. Good order.
75 H.-P. Ball Engine. 2d-hand. Good condition.
Also variety of Engines, Boiler Pumps, &c.
And other machinery, new and second-hand. Write for prices. **Machinery's Supply Company,**
39, 41 and 43 Central Ave., Rochester, N. Y.

SALE OR EXCHANGE.

1 8 x 20 Lathe, Wood & Light.
1 Bolt Header, new, guaranteed.
1 5 H.-P. Gas Engine, new, guaranteed.
1 10 H.-P. Gas Engine, new, guaranteed.
1 10 H.-P. Horizontal Engine and Boiler.
1 40 H.-P. Wright Engine.
1 35 H.-P. Locomotive Boiler.
1 Punch and Shears.
6 Steam Pumps, &c., &c.

H. H. MANFIELD,

126 Liberty Street, New York.

WANTED.

To furnish reasonable estimates on specialties in light metal work.

CLARK & COWLES, Plainville, Conn.
Manufacturers of Clock Trimmings, Rivets, Springs &c.

CORLISS

And Other Automatic Slide Valve Engines, Etc.

Corliss.	High Speed Auto.	Horizontal Slide Valve.	Vertical Slide Valve.
10 x 20	11 x 20	9 x 24	20 x 24
10 x 24	10 x 14	10 x 12	13 x 16
16 x 32	13 x 12	10 x 24	10 x 12
23 x 36	Horizontal Slide Valve.	11 x 20	9 x 10
26 x 43	23 x 36	12 x 18	9 x 9
30 x 60	16 x 36	12 x 24	7 x 7
30 x 72	15 x 24	14 x 24	5 x 5

HORIZONTAL BOILERS, 3, 4 x 16; 8, 5 $\frac{1}{2}$ x 16; 5, 5 x 16; 3, 5 x 18; 1, 4 $\frac{1}{2}$ x 12, and several others.
LOCOMOTIVE BOILERS, 30, 45, 50, 100 and 150 H.-P.
One 1000 gal. Duplex Fire Pump, Brennan Crusher, Bogardus Mill, Burr Mill, Fan Blower, Platform Scales etc., etc. Send for catalogue.

G. M. CLAPP, 74 Cortlandt St., New York.

!!! FOR SALE !!!

BAKER BLOWERS, Nos. 3, 4, 4 $\frac{1}{2}$, 5, 5 $\frac{1}{2}$, 6, 7 and 7 $\frac{1}{2}$
ROOT BLOWERS, Nos. $\frac{1}{2}$, 1, 2, 3, 6, 6 and 7.
Buffalo Blowers and Heating Apparatus.
1 Corliss Band Wheel, 12 ft. x 24 in., in halves.
1 No. 9 CLAYTON DUPLEX AIR COMPRESSOR, 22 in. Steam x 24 in. Air x 30 in. Stroke. Bargain.

A Variety of Machinery, very cheap.
Do you want to buy or sell Machinery? If so, write

C. R. BIGELOW, Machinery Expert,
45 Dey St., New York City.

16 inch Train of Rolls

12 inch Train of Rolls.

Blast Furnace Blowing Engine.

FOR SALE CHEAP BY

C. W. SCHULTZ & CO.,

308 Walnut St., PHILADELPHIA.

FOR SALE.

SECOND-HAND

IRON PLANING MACHINES.

30 in. x 30 in. x 10 ft., All Order.

NEW PLANERS.

22 in. x 22 in. up to 120 in. x 120 in., ANY LENGTH.

FROG AND SWITCH POINT PLANERS, LOCOMOTIVE CONNECTION ROD PLANERS, GLOBE VALVE PLANERS.

THE POWELL PLANNER CO.,
Worcester, MASS.

FOR SALE.

SECOND-HAND.

ENGINES, Horizontal and Vertical. All types and sizes up to 2000 H.-P.

BOILERS, Vertical and Horizontal and 3 Batteries of "Heine" water tube.

MILLS, 3 high, 12 in., 20 in., 22 in., 30 in. and 36 in. 1 Reversing 32 in. Blooming Mill complete.

STEAM HAMMERS. Various sizes up to 10 ton.

SHEARS. Cut from Bands to Blooms and one to cut Plates 14 in. thick, 80 in. long.

SQUEEZERS, ROLL LATHES, CRANES, GRINDING PANS, MACHINE SHOP TOOLS, &c.

LOCOMOTIVES. Fine condition, various sizes and gauges.

"If you don't see what you want, ask for it" of

B. M. EVERSON,

301 Smithfield St., Pittsburgh, Pa.

DON'T INVEST in expensive tools or machinery or let a contract before getting our estimate for making novelties or parts. Fine, difficult and accurate parts a specialty. White metal work at prices that cannot be duplicated. Inventions perfected. Models made. Secrecy and satisfaction guaranteed, and no extra charge for new ideas or improvements. To insure reply to letters of inquiry only, enclose stamp. **THE H. H. FRANKLIN MFG. CO.,**
Syracuse, N. Y.

FOR SALE.

Alligator Shears.

Blade two feet long, suitable for scrapping plate iron and cutting heavy bars. Apply to

DAN'L W. RICHARDS & CO.,

92 Mangin St., New York.

WANTED.

Responsible parties to manufacture and sell on royalty, a cheap portable steel or iron **OUT-VERT BRIDGE**; it is adapted to all small streams, runs, etc., in roads, streets, **RAILROADS**, etc.; improved roads is the order of the day; use this bridge, put it below the level of the road, cover it over and thus prevent jarring and wear and tear of vehicles, etc. Apply to
W. A. NICHOLS,
Girard Building, Philadelphia, Pa.

SECOND-HAND MACHINERY.

4 11 in. x 5 ft. Engine Lathes, Read and Prentice.
 2 12 in. x 6 ft. Young Speed Lathes.
 2 15 in. x 6 ft. Reed Engine Lathes, R. & F. & P. R.
 6 18 in. x 6 ft. Engine Lathes, Young, Read, Blaisdell and Flather.
 2 18 in. x 8 ft. Engine Lathes, New Haven and Dustin.
 4 20 in. x 6 ft. and 8 ft. Engine Lathes, Bullard.
 1 20 in. x 8 ft. Pattern Lathe and Floor Stand.
 1 20 in. x 6 ft. Bullard Turret Lathe (C), Power Feed.
 4 Brainard No. 7 Millers, 2 with arm.
 1 Brainard Heavy No. 6 Lincoln Pattern Miller.
 1 Brainard No. 15 Universal Miller.
 2 Brainard No. 5 Universal Millers.
 1 B. & S. No. 1 Universal, complete.
 6 Garvin Millers, Nos. 2, 3, and 4.
 1 Blaisdell 30 in. Single Spindle Drill.
 1 Garvin 1 Spindle Profiling Machine.
 8 Sensitive Drills, Slat, 1, 2 and 3 spindle.
 1 20 in. 38 in. Wood & Laiting Gap Drill.
 2 P. & W. Drills, 1 and 2 spindle.
 6 Bench Drills, capacity 5-18 in.
 2 Suspension Drills, Pond, heavy.
 2 Punch Presses, 1 Wilder and 1 Stiles.
 2 Garvin No. 2 Wire Feed and Plain Screw Machines.
 1 Garvin Small Gear Cutter.
 1 Bullard 15 in. Stroke Shaper.
 1 6 in. B. & P. Shaper, Hand and Power.
 2 Bolt Cutters, 1 1/2 capacity.
 6 Speed Lathes, Garvin and Young.
 1 No. 4 Diamond Grinder.
 1 Forge.
 1 27 x 27 x 6 ft. English Screw Planer.
 1 8 ft. Vertical Boring Mill, 2 heads and pulley attach.
 1 80 x 30 x 8 ft. Niles Planer.
 1 Bement Axle Lathe, Single.
 1 36 in. x 18 Engine Lathe.

ALSO LARGE STOCK NEW TOOLS**THE NILES TOOL WORKS CO.,**

Eastern Branch, 136, 138 Liberty St., N. Y. City.

New York Agents PRATT & WHITNEY Co.

FOR SALE, CHEAP.

400 tons of 80 lb. Rails, 75 tons of 25 lb. Iron Rails, 400 tons of 35 lb. second-hand Iron Rails with fastenings, one 4 horse-power Engine and 8 horse-power Boiler. Also other Engines and Locomotives, second-hand. Sawn and Cut Rails a specialty.

J. H. RICHARDSON & CO.,
Pittsburgh, Pa.

A N OLD ESTABLISHED hardware house in New York, whose salesmen cover the entire United States, wants the sole agency of American manufacturers of Chains, Toilet Clippers, Locks, Files, Carpenters' Tools and similar articles. Address

"W. B. G.," No. 105,

office of *The Iron Age*, 96-102 Reade St., New York.

FOR SALE.**CRANK and GEARED SHAPERS.**

Write us for Bargains.

J. STEPTOE & CO. Cincinnati, O.**Trustee's Sale of Machine Shop Equipment.**

Lathes, 52 in. swing, 41 ft. bed; 30 in. swing, 22 ft. bed, one Pit Lathe. Drills, 36 in. upright, 5 ft. post drill, Horizontal Drilling Machine. Machines, 5 new and 7 second-hand, from 100 H.P. down. Cranes, 15 ton Gib Crane, 30 ft. high; 12 ton Gib, 18 ft. high. Building, extra heavy timbered, 70 ft. span, 100 ft. long, fit to remove, two storied, iron clad. Hundreds of Iron Pulleys and Fly Wheels, Hangers and Shafting. Address

W. A. BOLE, Trustee,
Liberty Ave., cor. 25th St., Pittsburgh, Pa.

THE

Very Desirable Second Loft

No. 99 CHAMBERS STREET,
CORNER OF CHURCH, 25 X 100 FEET,

TO RENT,

from May 1st. Light and airy. Entrance on Chambers Street, with steam elevator on Church Street.

THE AMERICAN WRINGER CO.

CONTRACTS WANTED.

For light and medium castings and for blacksmithing and wood work, etc. We have the complete facilities of a very large agricultural implement manufactory and foundry. Address, with specifications,

"EXTRA CAPACITY,"
Care of Braostreet's, Louisville, Ky.

I WANT TO SELL

my Hardware store in Johnstown, Pa. Stock invoices about \$5000. Address

JOHN WAELDTIN,
Room 611 Union Trust Building, St. Louis, Mo.

LODGE AND DAVIS

Machine Tool Co., Cincinnati, O., U. S. A.,

Have for sale a large line of first-class second hand Engine Lathes, Planers, Shapers, Drill Presses, Milling Machines, &c.

WRITE FOR LIST AND PRICES.

A DOUBLE CUTTING**Paper Roll Cutter.**

Patent just issued and for sale. Cuts the Paper both ways. Adjustable to any width Paper. Requires no rod to hang roll in cutter. Made partly of wood and iron or all iron. Copy of Patent sent on application. Address

THOMAS GASKINS,
Arcadia, DeSoto Co, Florida.

FOR SALE.

Two 200 lb. and two 80 lb. Bradley Cushioned Helve Hammers. In good running order. Apply to

21 RICHMOND ST.,
Philadelphia, Pa.

Attention, Tool Manufacturers.

Well known German civil engineers and selling agents want to introduce and represent American novelties in Germany, especially in machine tools and any kind of tools for machine shops and engineering. First-class references. Correspondence in English, French and German. Address

"X. X.,"
office of *The Iron Age*, 96-102 Reade St., N. Y.

FOR SALE.

Hardware Store, with invoice about \$8,000. Cash or Bankable notes only. Splendid business. Established 1880. Good Location. Good reason for selling.

W. J. KELLEY HARDWARE CO.,
Greenville, Ohio.

A GOOD BUSINESS FOR SALE.

For settlement of an estate, it is necessary to dispose of a well established and profitable jobbing and retail business in the hardware, plumbing and machinery line, located in Albuquerque, New Mexico. Goods sold all over Central New Mexico and Northern Arizona. Full information and references furnished by mail, and business and books open to personal examination. Location the best in the United States for invalids suffering from pulmonary trouble. Address Lock Box No. 556, Albuquerque, N. M.

A RARE OPPORTUNITY.

A Hardware stock for sale. The owner and proprietor, after 28 years' successful business, jobbing and retail, desires to dispose of stock and good will. Annual sales \$120,000 to \$150,000; three traveling men employed; stock carried \$40,000 to \$50,000, but could be reduced \$10,000 or \$15,000. Situated in the heart of an agricultural belt, a healthy city of 20,000 people, a railroad centre, latitude same as St. Louis and climate all that could be desired. Parties interested, address

"TELEPHONE 117,"
office of *The Iron Age*, 96-102 Reade St., New York.

A FINE CHANCE

to invest in a splendid Hardware business in the finest little city in the West. Stock clean and neat, consists of Hardware, Stoves, Crockery and a general line of House furnishing goods. A change upward in prices will soon take place, therefore, now is "the time to invest." Address

"FINE CHANCE,"
office of *The Iron Age*, 96-102 Reade St., N. Y.

A RARE CHANCE

to secure an established Machine Tool business in New England, with a good supply of orders, is offered by the advertiser, who must give preference to other interests. Tools, stock, etc., will be sold at a bargain. Address

"E.,"
office of *The Iron Age*, 140 Franklin Street,
Boston, Mass.

Reduce Expenses.**Increase Sales.**

A good opportunity is offered to a concern manufacturing a line of goods pertaining to the Hardware trade to the value of \$50,000 to \$75,000 per year. Such a concern may be under heavy rent and expenses for power &c., more than they can afford to pay these times. To such we offer (all other things being satisfactory to both parties) room and power and consolidation of interests. We have a large new plant with first class water power, situated in a beautiful borough in the State of Connecticut about 100 miles from New York on two lines of railroads, one of which runs through the property. Plant adjoins the freight depot of one of the principal lines of railroad. Facilities for loading or unloading cars at six different points on the plant. Borough has all the modern improvements such as Water, Electric Lights, Gas, &c. &c. Room and power to employ 125 hands more than we now have. Owners (no agents) address, with full particulars and reference,

"PRESIDENT," P. O. Box 1042,
New York City.

BARGAINS, SECOND-HAND.

The following tools have been carefully overhauled and placed in perfect order, and are bargains.

12 in. x 5 1/2 and 14 x 6 Engine Lathe.
 13 in. x 7 and 15 x 7 Engine Lathes. P. C. and Rod Feeds.
 16 x 6 Porter Lathe, Compound Rest.
 18 x 10 Engine Lathe, P. C. Feed.
 24 in. B. G. Drill Press.
 24 x 24 x 8 Planer.
 New 10 in., 13 in., 15 in. and 22 in. Eng. Lathes.
 Planers, Shapers, Drill Presses, &c.
 SEBASTIAN LATHE CO.,
113-115 Culvert St., Cincinnati, Ohio.

For Sale At a Bargain.

A Porter Hamilton Slide Valve Steam Engine, 30 x 36, with wheel 12 ft. x 50 in. Rubber Belt, 11 ply, 110 ft. long 48 in. wide. Engine good as new. Built by William Tod & Co., Youngstown, O. Can be seen near Pittsburgh, Pa. For further particulars apply to

W. H. PARSONS & CO.,
4 Warren St., New York.

FOR SALE.

Stock and fixtures of an old Hardware and Tool store, in New York City, established over 75 years. Has customers on both continents. Merchandise and fixtures are clean and new. This is an opportunity for persons wanting an opening to make money. Incorporated. Only reason for selling is to close an estate. Address, appointing interview, "OLD BUSINESS," office of *The Iron Age*, 96-102 Reade St., N. Y.

100 CITIES AND TOWNS WANTING INDUSTRIES

Is the title of a pamphlet issued by the Illinois Central R. Co. If you are thinking of making a change in location and are not well informed as to the advantages of locating either in the West or South, write for a copy. If you want in a nutshell the

SALIENT POINTS OF OVER 100 PLACES

on the line of the Illinois Central and Yazoo & Mississippi Valley Railroads, giving the population, city and county debt, death rate, assessed valuation of property, tax rate, annual shipments, raw materials, industries desired, etc., apply to the undersigned. Our line is in the shape of the figure "7" and runs from Sioux Falls, S. D., and Sioux City, Ia., to New Orleans, passing through South Dakota, Iowa, Minnesota, Wisconsin, Illinois, Indiana, Kentucky, Tennessee, Mississippi and Louisiana, and has

NEARLY EVERY KIND OF RAW MATERIAL

used in manufacturing, together with populous sections which are large consumers of the manufactured product. To sound industries which will bear investigation, substantial inducements will be given by many of our places, and they will be welcomed heartily by the different sections traversed by the Illinois Central and Yazoo & Mississippi Valley Railroads. For all information on the subject, address

GEO. C. POWER,

Industrial Commissioner I. C. R. R., Central Station, Chicago, Ill.

FOR SALE.

A well assorted stock of Hardware in the city of Duluth, Minn. Business has been established for five years. Amount of stock about \$5000. Address

MARSHALL-WELLS HARDWARE CO.,
Duluth, Minn.

RECEIVER'S SALE. STRUCTURAL IRON WORKS. BIDS INVITED.

The entire Plant, fully equipped and ready for immediate operation, of the Riverside Bridge & Iron Works, situated at Paterson, N. J. (16 miles from New York City), and admirably located on the main line of the N. Y., L. E. & W. R. R., with switch connection. Area nearly 30 city lots. Plenty of skilled labor, strikes never have occurred. Facilities for handling the heaviest as well as light work. Will be sold at a great sacrifice and on easy terms. A RARE OPPORTUNITY to embark in a business with little capital that promises great results, considering the low price of iron and cheapness of capital. Address for full particulars

J. ALBERT VAN WINKLE, Receiver,
P. O. Box 34, Paterson, N. J.

N. B.—Remnant of stock of material, consisting of shapes, bars, rivets, bolts, &c., is offered for sale. Stock list can be had on application to receiver.

PITTSBURGH SALES AGENCY,

J. H. HILLMAN, Manager,
No. 8 Wood St.,
Pittsburgh, Pa.,
IS NOW ENGAGED IN THE

Sale AND Reorganization

Manufacturing Plants,

INCLUDING
Blast Furnaces, Rolling Mills, Machine Shops, Foundries, Agricultural Works, and Manufacturing Establishments Generally.
Dealers in Coal and Iron Lands.

Examinations and Reports
on Properties.
References on Application.

A Bargain.

A FINE Business Opportunity

for a live business man or two partners who have \$25,000 to invest in a first-class, old, well established and well located

JOBGING and RETAIL HARDWARE

business, which did not lose money last year.

STOCK IS WELL ASSORTED.

Good location in large Eastern City. Reasonable lease of premises can be continued. This will bear full investigation. Parties who can command above amount of capital address

"BARGAIN," Box 315,
office of *The Iron Age*, 96-102 Reade St., N. Y.

WANTED.

A new or second-hand Upright Power Hammer. About 30 lbs. Must be in good and complete working order. Address, giving full particulars,

"HAMMER,"
office of *The Iron Age*, 96 102 Reade St., N. Y.

ASSIGNEE'S SALE. —OF A— Manufacturer's Stock of Whips.

E. Bissell, Son & Co.,
AUCTIONEERS,

—Will Sell at Auction—
on Thursday and Friday, April 5th & 6th,
at 10 A.M. each Day,

BY ORDER OF
CHARLES W. WEST, Assignee,
At the Store, No. 52 Warren Street, N. Y.,
the entire stock of Whips and Lashes,
Manufactured by W. H. Owen.

This stock is the largest, finest and most complete of its kind ever sold at Auction, comprising over

7000 DOZEN WHIPS.
Including Carriage, Riding, Coach, Cab,
Team and Express Whips.

ALSO OVER
1300 DOZEN LASHES.
Including Buff, White & Russet, Horsehide Lashes, Cart, Stage, Buckskin and California Stage Lashes, etc., etc.
Also SAFE and DESKS.

Goods will be sold in quantities to suit the Jobbing and Retail Trade, and the sale will be worthy the attention of the largest buyers.

TO MANUFACTURERS AND IMPORTERS.

A man of energy and business qualifications, who has been in the hotel business for twenty years, intends establishing, in a live and growing city of over 100,000 inhabitants, an agency for several lines of trade which will not conflict. To this end he solicits correspondence from Manufacturers, Importers and jobbers. Satisfactory references and if business requires bond will be given. Please address

W. F. TOWNSEND,
P. O. Box 183, Syracuse, N. Y.

PUBLIC SALE —OF— THE BRANFORD LOCK WORKS.

Pursuant to the order of the Superior Court for the County of New Haven, in the State of Connecticut, the undersigned will sell at public auction, at the office of the Branford Lock Works, in Branford, Conn., at ten o'clock, A. M., on Saturday, April 14, 1894, the entire property of said Lock Works, as a going concern, including the real estate, machinery, tools, fixtures, patterns, materials, stock, accounts, and all of its other assets of every kind, to the highest bidder.

This offer of sale is subject to the condition that no bid will be considered the amount of which is not sufficient to cover all claims against the said Lock Works Company, including Receiver's charges. The total amount of said claims and charges is now estimated at about \$81,000. The sum required to be bid can be learned from the undersigned on or after April 4. The terms of payment are fifteen per cent. of the purchase price at the time of sale and the balance within twenty days thereafter. Information concerning said property may be had by application to the undersigned at the address given below.

HENRY C. WHITE, Committee,
828 Chapel St., New Haven, Conn.

ASSIGNEE SALE!
The remainder of the stock of General Hardware and Mill supplies, together with the store fixtures, contained in the store No. 331 Second Street, Little Falls, N. Y., assigned to W. A. Pepper Nov. 28, 1893, by John K. Taylor, will be sold to the highest bidder at
PUBLIC AUCTION,
MONDAY, APRIL 2d, '94,
AT 11 O'CLOCK, A. M.
W. A. PEPPER, Assignee.
Dated, Little Falls, March 24, 1894.

WRITE FOR STOCK LIST

OF

Shafting, Pulleys, Hangers, Boxes, Belting, Couplings,

USED AT THE WORLD'S FAIR.

The Belting is of the Best Quality, and the Shafting, Pulleys, Hangers, etc., are of the Highest Grade, and all of the material was in use such a short time that it is practically as good as new. This list comprises the entire outfit used in

Machinery Hall, Transportation and Electrical Bldgs.

Now stored in our warehouses
at Saginaw, Mich.

FOR PRICES ADDRESS

WICKES BROS.,

SAGINAW, MICH.

WANTED.

Second-hand Boiler Flue, 30 feet x 30 inches, either with or without heads. Boiler Shell 6 or 7 ft. diameter and 6 to 8 ft. long, with heads, or one 14 ft. long without heads.

NORTHFIELD KNIFE CO.,
Northfield, Conn.

FOR SALE.

Old established Hardware business, owner retiring from business. Grand opportunity to right person. Address "OWNER," office of *The Iron Age*, 96-102 Reade St., New York.

Collections?

ATTENTION! Merchants and Manufacturers.—We collect your past due accounts. Do not let them remain too long upon your books. Send for our draft book.

THE HARDWARE BOARD OF TRADE, Ltd.,
4 and 6 Warren street, New York.
JAS. H. GOLDEY, Treas.

FOR SALE OR LEASE.

New York City Rolling Mill, foot of East 23d street. Modern plant, consisting of three high 18 in. Muck Mill and 10 in. Finishing Mill, with Rolls to make $\frac{3}{8}$ in. to 2 in. round or square, $\frac{3}{8}$ in. to 3 in. flat, thick or thin sizes; two heating and one busheling or puddling furnace. Excellent location. Large trade in Merchant Bar and H. S. Iron, cheap scrap. Particulars and satisfactory reasons for disposing by personal interview only.

J. F. HANLEY,
502-506 East 23d St., New York.

FACTORIES TO LET.

At Orangeburgh, New York, 21 miles from New York City, on the West Shore and Erie Railroads, with switch from each road. Two new one-story brick buildings, 75 ft. x 130 ft., built on the most approved modern plans. Will be let, with electric power, either singly or together. This location is unsurpassed for manufacturing purposes. For further information apply to T. T. P. LUQUER, Agt.

45 Broadway, New York.

WANTED.

Stocks of Hardware in exchange for improved and unimproved farm lands in Iowa, Nebraska and South Dakota. WILLARD L. FROST, Sioux City, Iowa.

WANTED. ROLL LATHE.

50 in. swing, 16 ft. bed or larger. Must be in good condition; state price. Address BOX 716, office of *The Iron Age*, 59 Dearborn St., Chicago.

SITUATIONS WANTED.

Undisplayed Advertisements for Situations Wanted not exceeding fifty words Fifty Cents each insertion. Additional words one cent each.

BY A FOUNDRY FOREMAN; can work green sand, dry sand or loam; well versed in mixing and melting iron; references if required. Address "MOULDER," office of *The Iron Age*, 146 Franklin St., Boston, Mass.

BY FIRST-CLASS designer, modeler and Engraver for builders' and other hardware, metal patterns. Address "ENGRAYER," office of *The Iron Age*, 96-102 Reade St., N. Y.

YOUNG MAN, 24, excellent penman, with a knowledge of mechanics and two years' experience in the office of a large brass copper rolling and seamless tubing mill desires a position eventually as a salesman in some similar metal line; unquestionable references from present employer for character, honesty, etc. Address "METAL PRODUCER," office of *The Iron Age*, 96-102 Reade St., New York.

AN EXPERIENCED Hardwareman having sold his business in New York, knowing all the ins and outs of same, is open to engagement as manager, bookkeeper, buyer or any other capacity. Address GEO. MARKGRAF, Woodhaven, Queens Co., N. Y.

BY A 'HARDWAREMAN' of twenty years' experience, as buyer or assistant buyer; unlimited references. Address "BUYER," office of *The Iron Age*, 96-102 Reade St., N. Y.

BY TRAVELING Salesman, thoroughly experienced in full line of general and builders' hardware, cutlery, guns, tinware, etc.; has been manager in retail business; have made a specialty of cutlery, etc.; position in any of above lines in store or on the road with jobbers, manufacturers or manufacturers' agents. Address "BUILDERS' HARDWARE," office of *The Iron Age*, 59 Dearborn St., Chicago.

OUR SALESMAN is about to start on a trip over the United States and can take, besides our goods, a few specialties in hardware or cutlery line. Address, ten days, "ACTIVE," office of *The Iron Age*, 96-102 Reade St., N. Y.

AN ACTIVE BUSINESS MAN, with 15 years' practical experience in the management of iron properties, rolling mills, and manufacture of bars, shapes, sections, sheets and general merchant iron and steel, desires a position; can furnish best of references. Address "M. A. W.," office of *The Iron Age*, 509-510 Hamilton Building, Pittsburgh, Pa.

BY AN EXPERIENCED Millwright and Machinist to take charge of machinery; is a good mechanic and has 14 years' experience in rolling mills and steel works; strictly sober and steady; best of references given. Address "MILLWRIGHT," office of *The Iron Age*, 509-510 Hamilton Building, Pittsburgh, Pa.

CONNECTION with American tin plate manufacturers of first-class capacity wanted by a gentleman against English competition for the American trade. VICTOR STIEGLER, care P. H. Petry & Co., 23 So. William St., N. Y.

BY A TRAVELING SALESMAN of experience and ability, with a good record; a thorough knowledge of and acquaintance with the hardware trade from Buffalo and the Ohio River North and West to Duluth and the Missouri River; reference to employers and the trade; will make terms satisfactory. Address "SALESMAN," P. O. Drawer 1022, Rochester, New York.

BY A MECHANICAL and HYDRAULIC Engineer; experienced designer of hydraulic plants for the manufacture of solid drawn seamless steel tubing (for bicycles, boilers, hydraulic presses, &c.), gas and air vessels, shells and hydraulic forgings; competent to manufacture said articles; highest references. Address "HYDRAULIC," office of *The Iron Age*, 96-102 Reade St., New York.

A YOUNG MAN at present bookkeeper for a large engineering and manufacturing company, thoroughly posted in all business methods, desires a position where his duties will require some outdoor work or traveling; no objection to any part of United States; highest testimonials. Address "POSTED," No. 322, office of *The Iron Age*, 96-102 Reade St., New York.

AS MASTER ROLL TURNER and Designer; 28 years' experience on rails, beams, tees and channels, also sheet, plate, merchant bars and wire rods; willing to work in Canada or United States. Address "ROLL TURNER," P. H., 115 42d St., Pittsburgh, Pa.

FORCE of traveling salesmen of a house of highest rank, open for special work or side lines during ensuing six months. Experienced in implements, hardware, vehicles, etc. Cover thoroughly the Ohio Valley, Southern and Northwestern States. Address "EXTRA CAPACITY," care Bradstreet's, Louisville, Kentucky.

SELLING AGENCY WANTED, for blast furnace and iron and steel works products, by a gentleman having extensive acquaintance among railroads, foundries and shops. Address "AGENT," No. 111, office of *The Iron Age*, 96-102 Reade St., New York.

THE LATEST BOOKS.

Art of Coppersmithing. By JOHN FULLER, Sr. A Practical Treatise on Working Sheet Copper in all Forms. This work, prepared at great labor and expense, is reproduced from *The Metal Worker*, and forms an exhaustive treatise on the Coppersmiths' Art, being the only volume on that subject that has been published. It is beautifully illustrated with 474 pen and ink drawings, and is bound and printed in the best manner. 327 pages, 474 illustrations, 7 x 10 inches, cloth.....\$3.00

Concrete, Its Nature and Uses. By GEORGE L. SUTCLIFFE. A Book for Architects, Builders, Contractors and Clerks of Works. 8vo, cloth, illustrated.....\$3.00

The Modern American Pistol and Revolver. By RALPH GREENWOOD (A. G. GOULD). Entirely new edition. Very fully illustrated. 8vo, cloth.....\$1.50

A Text-Book on Gas, Oil and Air Engines; or Internal Combustion Motors without Boiler. By B. DONKIN. 136 illustrations, 434 pages, 8vo, cloth.....\$8.40

A Treatise on the Kinetic Theory of Gases. By H. W. WATSON. Second edition, revised and enlarged. 12mo, cloth.....\$1.00

Engineering Drawing and Design. By S. H. WELLS. A Manual for Technical Schools and Colleges. With numerous illustrations prepared expressly for the work. Part I.—Practical Geometry, Plane and Solid. Part II.—Machine and Engine Drawing and Design. 2 vols, 8vo, cloth.....\$2.50

Lamp Primer, or Lamp Light and Lamps, and How to Care for Them. By JOHN JONES-BURY. 12mo, flexible cloth.....\$0.50

The Theoretical Elements of Electro-Dynamic Machinery. By A. E. KENNELLY. 8vo, cloth.....\$1.50

The Illustrated Architectural, Engineering and Mechanical Drawing-Book. By R. S. BURN. For the use of school students and artisans. Tenth edition. 155 pages, 8vo, cloth.....\$1.00

Machine Construction and Mechanical Drawing. By T. CRYER and H. G. JORDAN. Fifth edition, revised and enlarged. 4to, cloth.....\$1.20

The Electric Transformation of Power and its Application by the Electric Motor, Including Electric Railway Construction. By PHILIP ATKINSON. Illustrated. 12mo, cloth.....\$2.00

Helical Gears. A practical Treatise. By a Foreman Pattern-maker, author of "Pattern-making," "The Principles of Mitting," etc. Illustrated with 100 engravings and frontispiece. 12mo, cloth, 127 pp.....\$2.00

A Manual of Practical Assaying. By H. VAN F. FURMAN, E.M. 8vo, cloth.....\$3.00

Pigments, Paint and Painting. By GEORGE TERRY. A Practical book for Practical Men. 12mo, cloth, 392 pp. Illustrated.....\$3.00

FOUNDRY PIG IRON SALESMAN desires position by 1st prox.; please state territory to be traveled. "FOUNDRY IRON," office of *The Iron Age*, 96-102 Reade St., New York.

A MEMBER OF AMERICAN SOCIETY of Mechanical Engineers, who has had 20 years' practical experience as follows: machinist, head draughtsman, erector of steam plants, engineering, estimating, contracting and office work and superintendent of large engine works, is available for responsible position. Address "ENGINE WORKS," No. 16, office of *The Iron Age*, 96-102 Reade St., New York.

HELP WANTED.

Undisplayed Advertisements for Help Wanted not exceeding fifty words One Dollar each insertion. Additional words two cents each.

CLERK for iron foundry; one who has had experience in keeping time, cost and piece workers' accounts. Address "CLERK," P. O. Box 1086, Philadelphia, Pa.

TRAVELING SALESMEN visiting stove and tinware, hardware, house-furnishing or plumbing and gas fitting trade, either retail or jobbing, will learn of something of interest by addressing "B. J. W. & Co.," Lock Box 47, Mercer, Pa.

FOREMAN for steel foundry; must be practically familiar with molding, melting and all details of foundry, and capable of taking full charge of work in absence of proprietor. Address, stating age, experience and salary expected, "STEEL FOUNDRY," office of *The Iron Age*, 96-102 Reade St., New York.

SALESMEN in Arkansas, Miss., Ala., Georgia, So. Carolina and Florida to sell staple line of hardware on commission. Address "EDWARDS," care E. S. ADAMS, office of *The Iron Age*, 312 The Cuyahoga, Cleveland, O.

Depreciation of Factories, Mines and Industrial Undertakings and their Valuation. By EWING MATHESON. Second edition. 143 pages, 8vo, cloth.....\$3.00

Notes on Cylinder Bridge Piers and the Well system of Foundations. By JOHN NEWMANS. Especially written to assist those engaged in the construction of Bridges, Quays, Docks, River Walls, Weirs, &c. 136 pages, 8vo, cloth.....\$2.50

Metal Working for Amateurs. Edited by FRANCIS CHILTON YOUNG. In 3 parts. Part 1, Brazing and Soldering, by G. Edwinton. Part 2, Practical Gas Fitting, by E. W. Denniss. Part 3, Brass Casting at Home, by F. J. Durance. Illustrated with numerous diagrams, explanatory sketches and working drawings. 110 pages, cloth.....\$0.40

Benner's Prophecies of Future Ups and Downs in Prices; what years to make money on Pig Iron, Hogs, Corn and Provisions. By SAMUEL BENNER, an Ohio Farmer. Ninth edition, with forecast for 1894. Cloth.....\$1.00

The Incandescent Lamp and its Manufacture. By G. S. RAM. 218 pages, 8vo, cloth.....\$3.00

Applied Mechanics, specially arranged for the use of Students preparing for the Examinations of the Science and Art Department. By J. SPENCER. 8vo, cloth, pp. 264.....\$1.00

Marine Boiler Management and Construction, being a treatise on Boiler Troubles and Repairs, Corrosions, Fuels and Heat. On the Properties of Iron and Steel, on Boiler Mechanics, Workshop Practices and Boiler Design. By C. E. STROMEYER. 8vo, cloth.....\$5.00

"The Iron Founder" Supplement. By SIMPSON BOLLAND, Practical Molder and Manager of Foundries; author of "The Iron Founder," &c. A complete illustrated Exposition of The Art of Casting in Iron. Illustrated with over two hundred engravings. 400 pages. 12mo, cloth.....\$2.50

How to Wire Buildings. By AUGUSTUS NOLL, E. E. A Manual of the Art of Interior Wiring. Cloth, 8vo. Illustrated. 162 pages.....\$1.50

Notes on the Testing and Use of Hydraulic Cements. By FRED. P. SPAULDING. NATURE AND PROPERTIES OF CEMENT; Definition; Portland Cement; Natural Cement; Slag Cement; Setting; Hardening; Adhesion; Soundness; Permanence of Volume. CEMENT TESTING: Object of Testing; Weight and Specific Gravity; Fineness; Rate of Setting; Tensile Strength; Ordinary Tests for Soundness; Accelerated Test for Soundness; Chemical Analysis; Compressive Tests; Adhesive Tests; Microscopic Examinations; Abrasive Tests; Air Slaking. THE USE OF CEMENT: Sand for Mortar; Water for Mortar; Mixing Mortar; Preparation of Concrete; Mixtures of Lime and Cement; Freezing of Mortar; Permeability of Mortar; Expansion and Contraction of Mortar; Retempering Mortar; Literature Relating to Cement. Cloth.....\$1.00

Mining. By A. LUPTON. An Elementary Treatise on the Getting of Minerals. 12mo, cloth.....\$3.50

Sent, post-paid, on receipt of price, by

DAVID WILLIAMS, PUBLISHER & BOOKSELLER
96-102 READE ST., NEW YORK.

"Originators of Steel Hollow Ware."
' PIONEERS OF HEAVY METAL STAMPING.' SPIDERS,
 Flat POLISHED-TINNED-ENAMELED GRIDDLES,
 "SILVER STEEL" KETTLES,
 Steel Washers. **HOLLOW WARE.** MASLINS,
 Steel Pipe Hooks. ALL KINDS OF SCOTCH-BOWLS,
 HEAVY and LIGHT STAMPING, BLANKING, Etc., Etc. HOTEL-WARE.
THE AVERY STAMPING CO., - - - CLEVELAND, O.

CRUCIBLE STEEL CASTINGS.

Why send your PATTERNS EAST and WAIT
 FOUR WEEKS for your CASTINGS when you can
 get

SOLID STEEL CASTINGS

at home PROMPTLY? Answer

THE KING & ANDREWS CO.,

No. 218 N. Union Street, CHICAGO, ILLS.

KEEP POSTED

and you will know what is going on. Possibly you do not need a cutting-off machine just at present, but if you use one or ever expect to need one, you ought to know about the latest improvements, and we are the ones to tell you. We have some new tool blocks, an accelerated speed device and other things we would like to show you. Perhaps you have one of our machines; then you certainly should examine our latest style. We shall be only too glad to send you our circulars, list of users, photographs and prices. We hope you will feel interested enough to drop us a postal.

HURLBUT-ROGERS MACHINE CO., So. Sudbury, Mass.

RAIL.
BEAM.
BAR.

ROLLS.

STRUCTURAL.
SPECIALS.
SHAPES.

EAST CHICAGO FOUNDRY COMPANY,

Office, 716 "The Rookery," - - - CHICAGO.

FOR NUMBERING AND LABELING
Boxes, Drawers and Shelves
In Hardware Stores and Factories.

Send for sample and description of our Handy
Box of small gummed Letters and Figures, intended
for labeling shelf boxes. Put up especially for the
Hardware trade.

THE TABLET AND TICKET CO., Mfrs.,
87-89 Franklin St. 99 Franklin St.,
Chicago. New York.

WILLSON'S PAPER LETTERS

The English and American Mechanic:

AN EVERY-DAY HAND-BOOK FOR THE WORKSHOP AND THE FACTORY.

CONTAINING

Several Thousand Receipts, Rules and Tables indispensable to
the Mechanic, the Artisan and the Manufacturer.

By B. Frank Van Cleve.

A new, revised, enlarged and improved edition, edited by Emory Edwards, M.E.

ILLUSTRATED WITH EIGHTY-FIVE ENGRAVINGS.

In one volume, 500 pages, 12mo, closely printed, containing a vast body of information of value
to all practical men. Elegantly bound in scarlet cloth, gilt. Price \$2.00.

SENT POSTPAID, ON RECEIPT OF PRICE, BY

DAVID WILLIAMS, Publisher and Bookseller, - 96-102 Reade Street, New York.

CLEAN and WHOLESOME.

NOW is the time to INVEST in
SOUTHERN TIMBER- MINERAL LANDS,
 Before prices advance. All kinds of mines
 for sale.
E. C. ROBERTSON,
 Terms Easy. CINCINNATI, O. Titles Perfect

You ought to.

A GREAT many merchants are using
Ladd's Discount Book.

Every day adds to the number of those
 who highly esteem this valuable work.
 Very many people both in America and
 abroad have commended it highly as a
 time-saver and money-earner. It is
 positively

Accurate, Saving many times its
 cost in preventing er-
 rors.

Rapid, - - Saving much valuable
 time, and "Time is
 Money."

Practical, As proved by its con-
 stant use by those who
 would not now do with-
 out it.

The cost is small, the book will
 last for years, you can depend upon
 the results without proving.

A great many bright people are us-
 ing LADD'S DISCOUNT BOOK, and

You ought to.

Regular Edition, \$3.00 } Sent postpaid
 Double Indexed, 4.00 } upon receipt
 of price by

DAVID WILLIAMS,

Publisher and Bookseller,

96-102 Reade Street, - New York.

KEEP BOOKS

by WEST'S New Original-ENTRY LEDGER.

Make the same entry but once. A Ledger in place
 of a full set of books. Convenient forms for all
 entries. Easily applied, simple, saves time. West's
 Self-Proving Balance locates every error. Send 3
 2-cent Stamps for illustrated 16-page pamphlet.

WOLCOTT & WEST, Syracuse N. Y.

THE STEEL AND IRON IMPROVEMENT CO.,

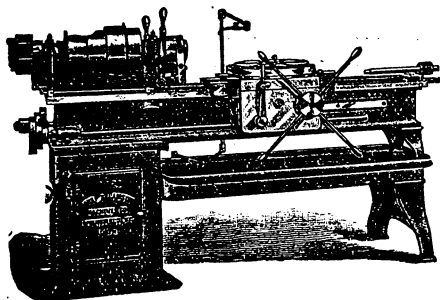
Controlling the Adams-Blair Process and other Steel and Iron Patents.

High Grade Open Hearth Steel produced by the Adams-Blair Process at less than the Cost of BESSEMER Steel.

91 and 98 Fifth Ave., Pittsburgh, Pa.

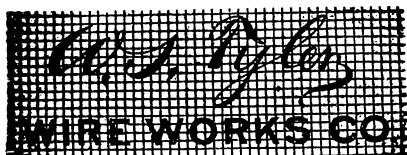
EASTERN OFFICE: 412 Drexel Building, Philadelphia, Pa.

HAVE YOU A
FLAT TURRET LATHE ?



If not send for

RAPID LATHE WORK.
JONES & LAMSON MACHINE CO.,
SPRINGFIELD, VT., U. S. A.



MANUFACTURERS OF

Extra Heavy Double Crimped Wire Cloth
FOR STAMP BATTERIES.

Steel, Iron, Brass and Copper Cloth for Coal and Ore
Screens, Flour Mills, Paper Mills and Maltsters

W. S. TYLER, Pres. PROCTOR PATTERSON Sec. & Treas.
CLEVELAND, OHIO.

LABORATORIES OF
DR. GIDEON E. MOORE,
221 Pearl St., New York.

DEPARTMENT OF CHEMISTRY. Analyses and
Assays of Ores, Metals, Waters, Fuel, Oils and
Natural and Industrial Products of every
description.

DEPARTMENT OF PHYSICAL TESTS. Chas. F.
McKenna, Director. Tensile, Transverse and
Compression Tests of Iron, Steel and other
Metals and Alloys, Cements, Building Stones
and Engineering Materials generally. Tests of
Lubricating Value of Oils, etc., etc.

PRINTED PRICE-LISTS ON APPLICATION

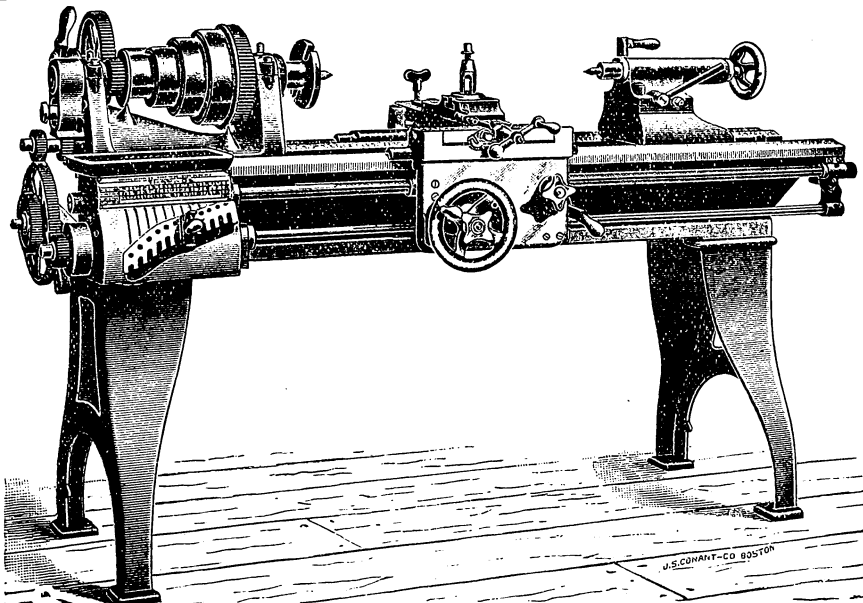
ALUMINUM.

The Pittsburgh Reduction Co.,

116 Water St., Pittsburgh, Pa.,

Offer Aluminum guaranteed equal
in purity to the best in the market,
at lowest rates obtainable.

**ALUMINUM SHEET, WIRE,
AND CASTINGS.**



The Hendey Machine Co., Torrington, Conn.

A NEW FEATURE IN SCREW CUTTING ENGINE LATHES. THE HENDEY-NORTON LATHE.

This lathe cuts 12 different screws, from 6 to 20, without changing the gears, and feed changes from 36 to 120 cuts per inch without change. This cut shows a 14-inch x 6-foot Lathe. It has hollow spindle, 1-inch. Has compound or elevating rest, as preferred, or the double carriage rise and fall rest. Also taper attachment if desired. The carriage reverses for screw cutting without the use of the countershaft, from the lever at the end of carriage, allowing the spindle to run in one continuous direction. In stock for immediate delivery, 14-inch, 16-inch and 18-inch; 20-inch and 30-inch in the works. Send for descriptive catalogue.

CHAS. CHURCHILL, Ltd., London, England,
SCHUCHARDT & SCHUTTE Berlin, Germany, } AGENTS.
EUGENE SOLLER, Basel, Switzerland,

The Hendey Machine Co., - Torrington, Conn.

DO YOU BORE CYLINDERS ?

THE HORIZONTAL BORING MACHINE

IS A SPECIAL TOOL FOR THIS PURPOSE.

SEND FOR PARTICULARS TO

NEWARK MACHINE TOOL WORKS,
NEWARK, N. J.

J. A. FAY & Co., CHICAGO, WESTERN AGENTS.

THE STEARNS Bicycle Catalogue gets this mention
in the Book Reviews of the *Syracuse Standard*.

This Catalogue is not
only a work of art, but
a wheelman's hand-
book. It tells you
why the Stearns Bi-
cycle leads the world.

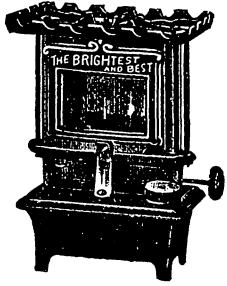
SEND FOR IT.

E. C. STEARNS & CO.,

Syracuse, N. Y.

THE manufacturers of bicycles in this country are
exhausting every resource of the printer's art,
the annual catalogue for 1894 representing in typo-
graphical achievement the greatest advances made in
composition, illustration and press work. Of the
various examples of beautiful printing issued in the
interest of the bicycle trade, the catalogue which is
sent out by E. C. Stearns & Co., of this city, is easily
the best. The descriptive matter is incised in illumi-
nated and embossed covers, struck off in fine colors,
in a design that would be an adornment for a book that
was to be sold instead of given away. Inside the pages
are superbly printed, the reading matter being
rendered entirely comprehensive even to beginners in
bicycling by the detailed illustrations furnished. E.
C. Stearns & Co. have published a handbook that will
command wide attention.

B. & B. Money Makers.



No. 01 B. & B. LAMP STOVE.

List Price, \$8.00 per dozen.
Code word, *Garden*.
Packed one dozen in box.
Weight, 50 lbs.
Height, 8½ inches. Size of Tank,
3½ x 5¼ inches.
NICKEL FRONT. Four-inch wick.



No. 03 B. & B. LAMP STOVE.

List Price, \$24.00 per dozen.
Code word, *Gauge*.
Packed ½ dozen in box.
Weight, 65 pounds.
Height, 8½ inches.
Size of Tank, 5¼ x 8¼ inches.
NICKEL FRONT. Three 4-inch Wicks.

No. 02 B. & B. LAMP STOVE.

List Price, \$16.00 per dozen.
Code word, *Garter*.
Packed one dozen in box.
Weight, 85 pounds.
Height, 8½ inches.
Size of Tank, 5½ x 5¾.
NICKEL FRONT. Two 4-inch wicks.



Our discounts will interest you. B. & B. Lamp Stoves, Ovens, Cook Stoves and Oil Heaters are up to the times. Our Prices are made to suit the times. Ask for our 80 page catalogue and be convinced.

The Glazier Stove Co., Mfrs., CHELSEA, MICH.

W. W. MONTAGUE & CO., San Francisco, General Agents for the Pacific Coast.

WHITE MOUNTAIN FREEZERS.

— STILL IN THE LEAD. —

Freezers All Right. Prices All Right.

INQUIRE OF ANY LEADING JOBBER OR WRITE US.

The White Mountain Freezer Co., Nashua, N. H.



The true test of a Freezer is how well it performs its work; in this respect the unsolicited testimony of thousands pronounce the "Packer Freezers" unexcelled.

GOOD LUCK, STANDARD,

AND CONFECTIONERS' MACHINE FREEZERS.

The "Good Luck" is the latest and best low price Freezer on the market. Inside Castings Tinned, Malleable Iron Fittings, Automatic Scraper. White Cedar Pails with Galvanized Steel Hoops. Fine Pails, or Wire Rings with bottom of pail unprotected are not used.

CHAS. W. PACKER, Mfr., 20 N. Fourth St., Philadelphia.

THE WILLIAMS PRINTING CO.,

Commercial Printers AND Binders.

ESTIMATES FURNISHED FOR ALL CLASSES OF WORK.

96, 98, 100 and 102 READE STREET, - NEW YORK.

COVERT'S SELF-LOCKING, GATE AND DOOR HOOK.
POSITIVELY PREVENTS BEING UNHOOKED FROM THE OPPOSITE SIDE THROUGH CRACK OR NARROW OPENING
MADE IN TWO SIZES
4 AND 6 INCH XC PLATED.

SAMPLE BY MAIL 15¢

Call for Our Banner Bolt Snap.

This snap has many important advantages over other makes of Bolt Snaps, viz.: It is lighter, the spring is entirely covered and protected from foreign substances and freezing, and is lower in price.

Made in all sizes; Round, Loop and Open Eye. We are headquarters and the most extensive manufacturers in Saddlery, Coach and General Hardware Specialties.

Covert's Saddlery Works,

FARMER, N. Y., U. S. A.

Hardware Dealers Can Profitably SELL BICYCLES.

There is a large trade in Bicycles in all parts of the country and much of that trade naturally belongs to dealers in hardware. Good bicycles meet with a ready sale and pay a fair percentage of profit.

COLUMBIAS

Are the representative high grade machines in America. A Columbia is the easiest machine to sell to the best trade because it is unquestionably the standard wheel of the world.

We want enterprising agents of good standing and solicit correspondence.

Pope Mfg. Co.,

221 Columbus Ave.,
Boston, Mass.

INSTRUCTION BY MAIL

In Architecture, Architectural Drawing, Plumbing, Heating and Ventilation, Bridge Engineering, Railroad Engineering, Surveying and Mapping, Electrical Engineering, Mechanical Drawing, Mining, English Branches, and

MECHANICS.

Diplomas awarded. To begin students need only know how to read and write. Send for FREE Circular of Information stating the subject you think of studying to THE CORRESPONDENCE SCHOOL OF MECHANICS AND INDUSTRIAL SCIENCES, Scranton, Pa.

4000 STUDENTS.

The Only Freezers Having Pails with Electric Welded Wire Hoops.

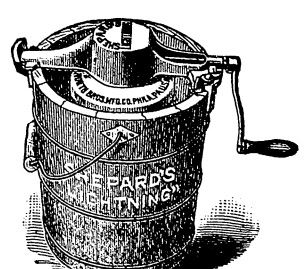
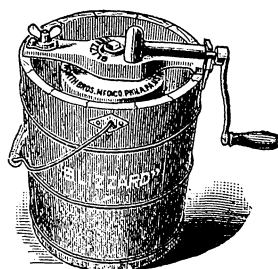
TWICE AS STRONG AS OLD STYLE FLAT HOOPS.

GUARANTEED NOT TO FALL OFF

Pails are made of Best Virginia White Cedar,

The best wood known to man for resisting the action of water.

For Particulars, Prices and Discounts, Write



"Three of a Kind" in that they are all BETTER than "the Best" of other Makers.

NORTH BROS. MFG. CO., Philadelphia, Pa.

NEW YORK AGENTS
John H. Graham & Co.
113 Chambers St.

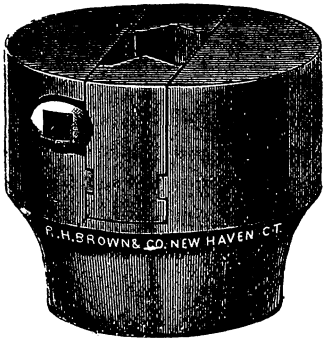
REID DRILL CHUCKS.

THREE SIZES.

No. 0 takes any drill from 0 to 1-2 inch inclusive.

No. 1 " " " " 0 " 3-4 " "

No. 2 " " " " 0 " 1 " "



They are the strongest and most durable made. Drill absolutely in the center. No twisting or bending necessary if drill is straight. Can be fitted to hollow spindle lathes for working long rods.

SEND FOR CIRCULAR.

R. H. BROWN & CO., - New Haven, Conn.

*You take no risk on the quality
We make only the best!*



**Sand
Papers**
IN
Reams and Roll

**Flint Paper
Garnet Paper
Emery Paper
Emery Cloth**

HAIR FELTING for covering Boilers, Steam and Water Pipe, and lining Refrigerators.

BAEDER, ADAMSON & CO.

780 MARKET STREET, PHILADELPHIA.
67 BECKMAN STREET, NEW YORK.
142 MILK STREET, BOSTON.
102 LAKE STREET, CHICAGO.

THE GEM SOLID STEEL MINCER



Single
and
Double Blades.

Handle and Blade Formed in one piece.
Always Clean. Indestructible.
No Rivets to Wear Loose.
No Wooden Handle to Shrink, Swell, Loosen.
Split, or Fill with Rancid Grease.

MANUFACTURED BY
PALMER HARDWARE MFG. CO.
TROY, N. Y.

ROLLER JACK SCREW.



We have experimented much with ball bearing Jacks, and found them very satisfactory when not heavily loaded. Now, instead of balls we put in rollers, as seen in cut. These rollers will stand any load that the Jack will carry, and are not liable to get out of order. We have thoroughly tested these Roller Jacks with a spring balance and find a saving of forty per cent. of power needed to lift a given weight.

The price is about ten per cent. more for Roller Jacks, and the gain is 40 per cent. This ought to insure their sale as fast as the facts become known.

MILLERS FALLS CO.,

93 READE STREET, - - - NEW YORK.

S. & P SOUP DIGESTERS.

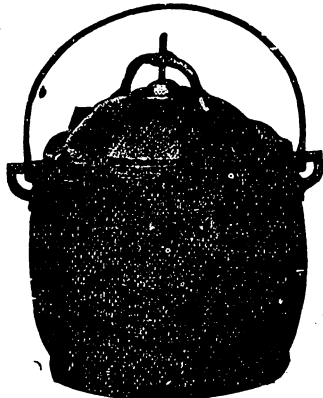
Tinned or Enameled.

With Steam Valve and Covers Ground to Fit Tightly.

The aroma is saved.
The only practical mode of making delicious soups.
It has often been remarked that the French cooks can make excellent soup out of what others throw away. The secret is they use proper appliances.

Sizes, 4, 6, 7, 8 and 10 Qt., 3, 3½, 4, 5 and 6 Gal.

WRITE FOR PRICES.



THE STUART & PETERSON CO.,

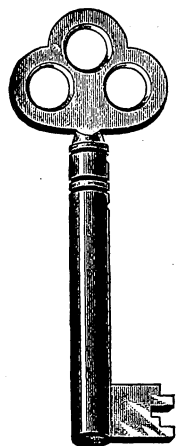
Burlington, N. J., U. S. A.

BOOKS.

YOU CAN OBTAIN PROMPTLY the latest work on any subject in which you are interested by addressing DAVID WILLIAMS, Publisher and Bookseller, 96-102 Reade Street, New York.

CABINET LOCKS

OF EVERY KIND.



DRAWER LOCKS,
CUPBOARD LOCKS,
WARDROBE LOCKS,
CHEST LOCKS,
DESK LOCKS.

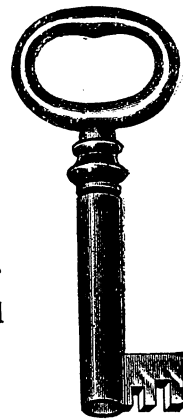
A complete line of more than 1000 list numbers exclusive of our old
and complete line of

YALE CABINET LOCKS.

THE YALE & TOWNE M'F'G CO.,

STAMFORD, CONNECTICUT.

New York. Chicago. Philadelphia. Boston. Pittsburg. San Francisco.



THE DEALER who sells what
THE PEOPLE ask for
MAKES FRIENDS and MONEY, and
SAVES TIME and TROUBLE.

The people ask for

**LePage's
Liquid
Glue,** And the people are right.

It is the strongest and best glue made. It has been
imitated, but never equalled. Be sure to get what you
order and ACCEPT NO SUBSTITUTES.

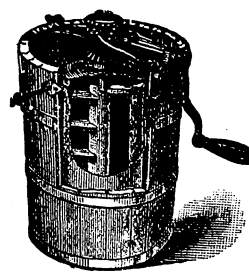
Our name is on every label

RUSSIA CEMENT CO.,

GLOUCESTER, MASS.

New York Office, 95 Reade and 113 Chambers Streets.

Pacific Coast Office, 23 Davis Street, San Francisco, Cal.



"RAPID."

Send for Descriptive Catalogue and Attractive
Quotations.

CLEMENT & DUNBAR,
No. 1129 Beach St., PHILADELPHIA.

"Home" Freezers,
2 to 10 quarts.

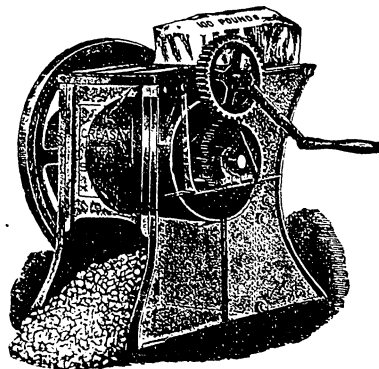
"Rapid" Freezers,
2 to 40 quarts.

"Rapid"
Ice-Breakers,
4 sizes.

Sundry Ice-Cream
Apparatus.

CREASEY ICE BREAKERS.

HAND OR POWER. 7 Sizes.



No. 1 (Hand or Power) Machine.

Jos. S. Lovering Wharton,
MANUFACTURER,
GERMANTOWN JUNCTION,
PHILADELPHIA, PA.

Phillips Screens

FOR DOORS AND WINDOWS, ARE WELL
MADE, FROM GOOD MATERIALS BY

A. J. Phillips & Co., Fenton, Mich.

Closing Out Leading Lines of Tools.
Starrett's, Stevens', Brown & Sharpe's, Chesterman's, Stub's, Grobet
and other makes of Tools and Files, Moulders' Tools, Chucks, Drills and
Reamers, Steel Rules, Squares, Calipers and Dividers, Brass Gears and
Pinions. Call early while assortment is unbroken.

THE FRASSE COMPANY, 19 Warren St., N. Y.

P. O. BOX 379.

Hicks' Builders' Guide.—Comprising an easy,
practical system of estimating material and labor
for carpenters, contractors and builders. A com-
prehensive guide to those engaged in the various
branches of the building trades. By I. P. Hicks;
illustrated by numerous engravings of original
drawings. 160 pages; cloth\$1.00
For sale by David Williams, 96-102 Reade St., N. Y.

W. & B. DOUGLAS, MIDDLETOWN, CONN.

Branch Warehouses: 85 and 87 John St., New York; 197 Lake Street, Chicago, Ill.

THE OLDEST AND MOST EXTENSIVE MANUFACTURERS OF

Pumps, Hydraulic Rams, Garden Engines,

Yard Hydrants, Street Washers, Galvanized Pump Chain, Wind Mill Pumps and other Hydraulic Machines in the World.

DOUGLAS' DIAPHRAGM PUMPS, "Loud Patent."

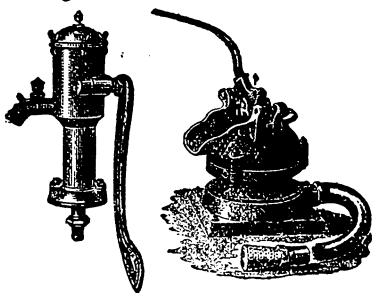
A LARGE CAPACITY AND EASY WORKING PUMP FOR

Water Works, Sewer Contractors, Foundation Builders, Mines, Quarries;

Fig. 209.

Fig. 381.

Fig. 145.



or wherever it is desired to raise a large quantity of water by
hand power.

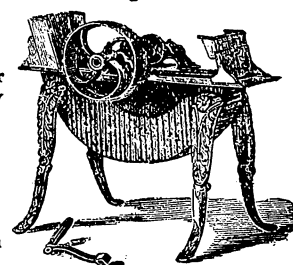
The pump has large valves (accessible by hand), and will pump water containing sand, gravel, sewage matter, &c., without choking or any perceptible wear.

CAPACITY

from 3,000 to 4,500 gallons per hour.

These pumps are simple, durable and low priced.
Made either as shown in cut for Hose or for IRON Pipe Suction underneath.

Send for Circular and Price List.



C. I. Grindstone Frame.

THE DEMING
FACTORY
SALEM O.U.S.A.
MANUFACTURERS OF
HAND & POWER
PUMPS,
WELL
SUPPLIES
& C. VERTICAL STEAM PUMPING
ENGINES.
N.Y. OFFICE
72 JOHN ST.
HENION & HUBBELL
GEN'L. WESTERN AGTS.
55 & 57 N. CLINTON ST.
CHICAGO, ILL.

ARTESIAN WELL
CYLINDERS.
HYDRAULIC
RAMS.

PRENTISS' PAT. VISES.

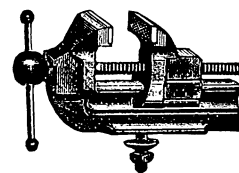
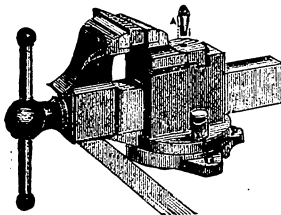
The Leaders for 20 Years.

Send for Illustrated Catalogue
of

ALL KINDS OF VISES.
PRENTISS VISE COMPANY,

MANUFACTURERS,

44 Barclay St., New York.



SHARP TOOLS are a NECESSITY to a good workman,

But without a GOOD WHETSTONE they are an impossibility.

That is why it is always economy to buy

PIKE'S WHETSTONES.

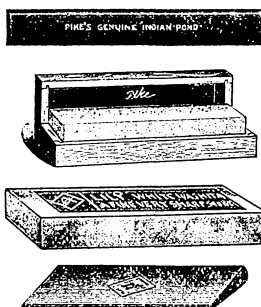
Pike's Indian Pond Scythe Stone, Strong, Sharp
Grit, Quick Cutting.

Scythe Stones.

Oil and Water Stones.

GREEN MOUNTAIN,
LAMOILLE,
BLACK DIAMOND,
FREM. QUINNE SAUG.
WHITE MOUNTAIN,
GENUINE RAGG,
WILLOUGHBY LAKE.

WASHITA,
ARKANSAS,
HINDOSTAN,
WATER OF AFR.
RAZOR HONES,
TABLE HONES,
AXE STONES, ETC.



THE PIKE MFG. CO., - Pike Station, N. H.

F.E. MYERS & BRO.

WORLD'S FAIR
LIFT PUMPS
ASHLAND, O.
+ CATALOGUES FREE +
The Largest Pump & Tool Works
Exclusively in the United States

Ashland Pump and Hay Tool Works.

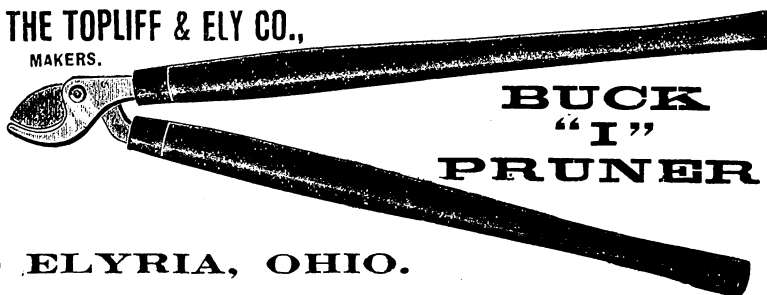
The New York Safety Dumb Waiter.
"The Manhattan Dumb Waiter."
"The Improved Humphrey Hand Elevator."
Made specially to be sold by Hardware Stores.
Thousands in use. Catalogues on application.
THE STORM MANUFACTURING CO.
NEWARK, NEW JERSEY.
Formerly of Poughkeepsie, New York.

SPEAKING TUBE ETC.
FOR ILLUSTRATED CATALOGUE
J.F. WOLLENSAK
CHICAGO, ILL.

J.F. WOLLENSAK
CHICAGO, ILL.

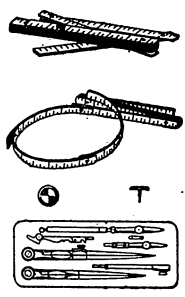
THEATRICAL HARDWARE
FOR ILLUSTRATED CATALOGUE
SEND PRICE LIST

THE TOPLIFF & ELY CO.,
MAKERS.



ELYRIA, OHIO.

Every Pair Warranted.
Liberal Discount to
Trade.



KEUFFEL & ESSER CO.

NEW YORK.
BRANCH: CHICAGO.
• FACTORIES: HOBOKEN, N.J.

MANUFACTURERS OF EXCELSIOR MEASURING TAPES.
SUPERIOR QUALITY, LATEST IMPROVED. GREATEST VARIETY.

STEEL • METALLIC • LINEN • POCKET TAPES.

EXCELSIOR BAND CHAINS FOR SURVEYORS; LAND CHAINS, &c.

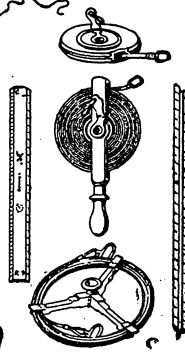
K & E CO FOLDING POCKET RULES.

NO WARPING, NO SHRINKING, NO ILLEGIBLE JOINTS, NO BULK.
2. 3. 4. 5. 6. 8 FOOT, ALSO WITH PATENT SPRINGS.

FLAT & TRIANGULAR BOXWOOD SCALES, BEST MADE.

PLUMB BOBS, THUMB TACKS, DRAWING INSTRUMENTS.

PRICE LISTS & QUOTATIONS PROMPTLY SENT.



IRON INSTEAD OF WOOD.

GALVANIZED IRON TUBING and CURB,

— FOR —
CHAIN PUMPS,
(Kegler's Patent)

[Are Giving Universal Satisfaction,

BECAUSE:

They do not rust and accumulate filth—always clean. Extreme lightness is combined with strength and durability. No freezing. No waste of water by reason of enlarged reservoir at top of tubing. No annoying wheel at bottom. Easy to handle.

Tubing weighs less than 1/4 lb. per ft., is connected by couplings and can be attached to any make of curb.

Send for Catalogue.

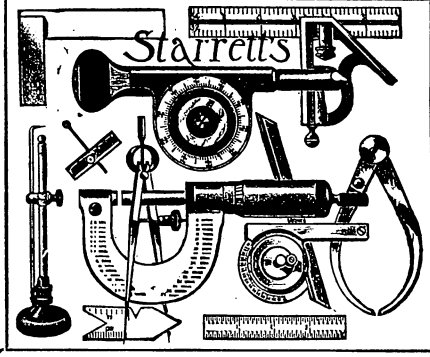
Bellevue Pump Co., Bellevue, Iowa.

Skilled mechanics prefer them

Live dealers sell them

STARRETT'S

Best in workmanship
Finest in finish
Latest in improvements

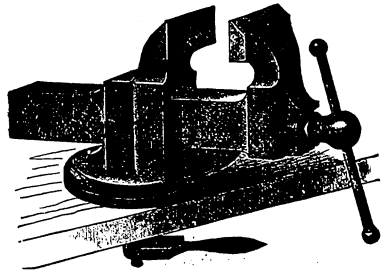


For all workers in metal or wood
Every tool warranted satisfactory

FINE TOOLS

Send for Catalogue

L. S. Starrett, Athol, Mass.



VICES OF ALL SIZES AND STYLES.

ATHOL MACHINE CO.,
ATHOL, MASS., U. S. A.

SEND FOR CATALOG.



HOLLANDS OFFSET JAW VISE.

Specially adapted for drill press work where chucks can not be used and equally good for special or regular bench work.

Hollands Mfg. Co.,
ERIE, PA.,
Manufacturers all styles VISES.



N. Y. Mallet and Handle Works.
MANUFACTURERS OF **MALLETS.**
Also Cotton and Bale Hooks.

Patented Feb. 13, 1877, a new combination of Hooks.
456 E. HOUSTON ST.,
New York City.

A. J. WILKINSON & COMPANY,
MAKERS OF THE IMPROVED

Babbitt Combination Foot Lathe.

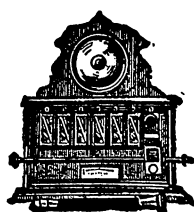
WITH HOLLOW SPINDLE.

The jig saw attachment will saw hard wood 1 1/2 inches in thickness, and swings 15 inches between the blade and standard.

The circular saw attachment has Iron table; planed true; perfectly adjustable; grooved at right angles (making guide and slide move true with the saw).

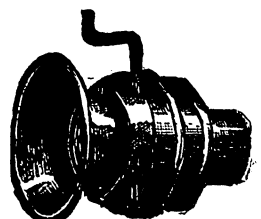
Write for a descriptive circular giving all particulars and price of lathe and attachments.

A. J. Wilkinson & Co.,
180 to 188 Washington St.,
Boston, Mass.

W. R. OSTRANDER & CO.,
204 FULTON STREET, NEW YORK,
Manufacturers of
SPEAKING TUBES, WHISTLES, ORAL, ELECTRIC
MECHANICAL AND PNEUMATIC ANNUNCIATORS
AND BELLS.

Complete outfits of Speaking Tubes, Whistles Electric, Mechanical and Pneumatic Bells. A full line always in stock. Send for new catalogue. Factory, DeKalb ave. near Knickerbocker, Brooklyn, N. Y.



GEO. N. CLEMSON, Pres.

S. S. BATTIN, Vice-Pres.

ROBERT J. JOHNSON, Treas.

F. B. EARLE, Sec.

THE NATIONAL SAW CO.,

OPERATING

Wheeler, Madden & Clemson Mfg Co., Wood-rough & McParlin, Richardson Brothers, Harvey W. Peace Co., Monhagen Steel Works, Wood-rough & Clemson, Pennsylvania Saw Co.

SEND FOR PRICE-LIST.

GENERAL OFFICE :

NEWARK, - - New Jersey,

SAWS

WENTWORTH'S PATENT NOISELESS SAW VISES,

WITH RUBBER CUSHIONED JAWS.

Prevent all vibration and render Saw Filing noiseless.
Will make no more noise than Filing on a Solid Piece of Iron.

Have a Larger Sale than All Other Kinds Combined.

PRICE LIST.

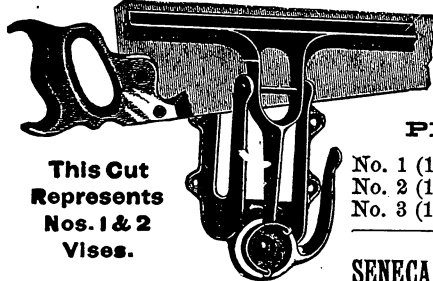
No. 1 (11 inch Jaws),	-	\$15.00
No. 2 (15 inch Jaws),	-	21.00
No. 3 (11 inch Jaws),	-	18.00

LIBERAL DISCOUNT TO THE TRADE.

LONGEST JAWS, HEAVIEST AND
BEST FINISHED.
Sold by all leading jobbers of gen-
eral Hardware at Factory Prices.

—MANUFACTURED BY—

SENECA FALLS MFG. CO., 255 Water St., Seneca Falls, N. Y.



This Cut
Represents
Nos. 1 & 2
Vises.



No. 3 Vise.

CARR'S
Improved
Surface
Gauge. Best sell-
ing tool in the
market. Agents wanted.
The Hoggson & Pettis Mfg. Co.,
NEW HAVEN, CT.,
Mfrs. of the Celebrated Sweetland Chuck.

WM. KROGSrud,
Engraver and Die Sinker,
61 Fulton St., N. Y.
Manufacturer of
STEEL STAMPS
For Every Purpose.
Steel Letters and Figures.
Burning Brands, Stencils,
&c. Send for Illustrated
Catalogue.

3 NICKLE, Silver and Bronze Metallic
Figures and Letters, Sizes 1/4 in to 3 in.
Pattern Letters, Steel Stamps, Brands,
Dies &c. Sent for Reduced Price List.
We make a specialty of the Hardware Trade.
A. A. WHITE & CO., Providence, R.I.

JESSE JONES & CO.,
HARDWARE
SHELF BOXES
Made of Wood.
No screws or
nails used to work
out and cut
your shelving
615 & 617 Commerce St., Phila.
Send for circular and list of references.

NEW ADJUSTABLE BENCH LEVEL.
WITH GROUND AND GRADUATED VIAL.

4-6 and 8 inch.

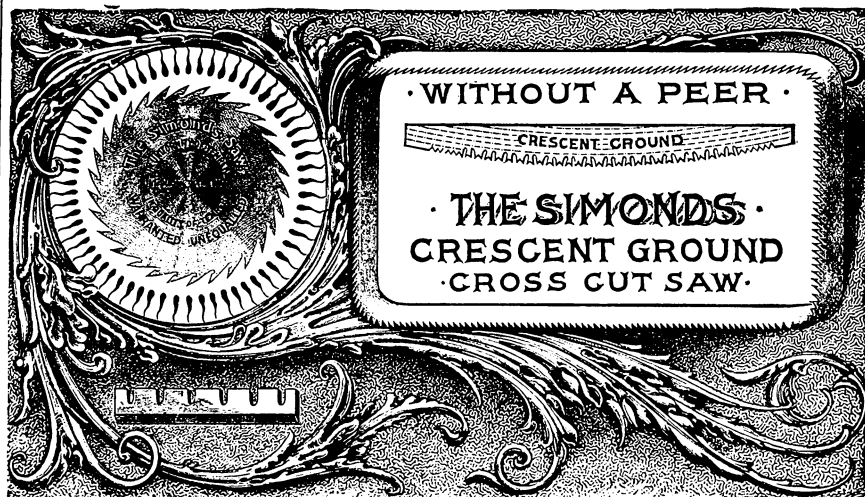


Three Sizes.

MANUFACTURED BY

C. F. RICHARDSON & SON,

ATHOL, MASS.



Simonds Mfg. Co. Simonds Saw Co.
FITCHBURG, MASS. CHICAGO, ILL. SAN FRANCISCO CAL. PORTLAND, ORE.

The Taintor Positive Saw Set.

Mechanics are now inquiring for this tool, and Hardware Dealers
should have them in stock, or at least have a sample.

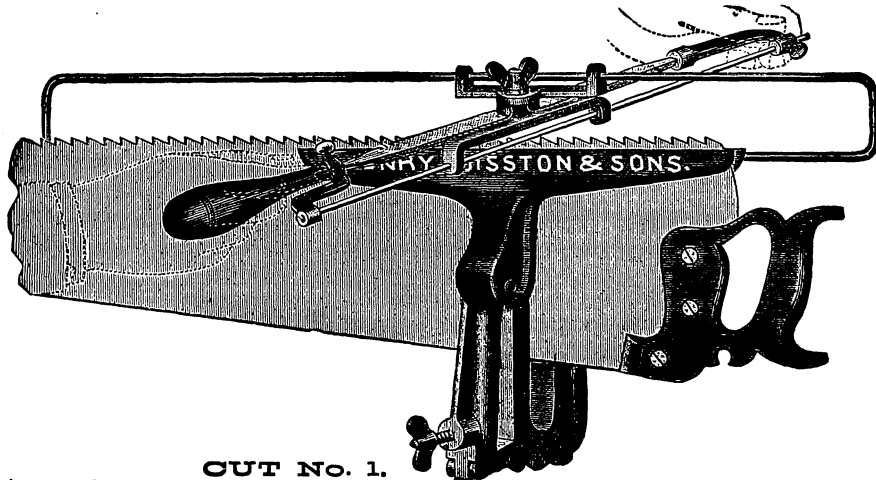
For Prices and Discounts, address

WIEBUSCH & HILGER, LTD., SOLE AGENTS,
84 and 86 Chambers Street, NEW YORK.

J.F. Wollensak
CHICAGO, ILL.
ELECTRICAL SUPPLIES
SEND FOR
ILLUSTRATED PRICE LIST
KEYS OF ALL KINDS
SEND FOR ILLUSTRATED CATALOGUE
CHICAGO, ILL.

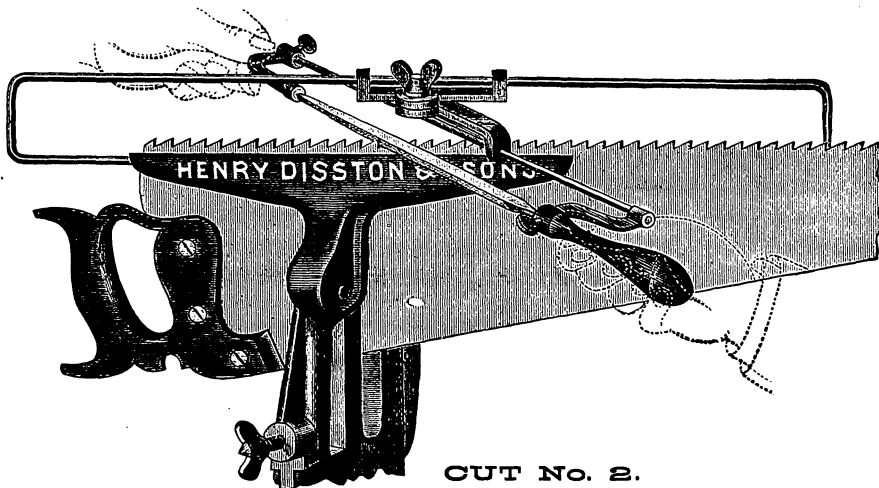
DISSTON'S Improved Saw Clamp AND FILING GUIDE.

ESPECIALLY DESIGNED TO ASSIST THOSE NOT SKILLED IN THE ART
OF SAW FILING TO FILE A SAW CORRECTLY.



CUT No. 1.

Cut No. 1 shows a saw and the attachment in proper position for filing the first side; and Cut No. 2 shows the saw and attachment reversed and in position to file the second side. There are three marks on one of the hubs of the swivel attachment, and one mark on the other. One of the three marks shows when it is in position No. 1, and the other designates when it is in position as shown in No. 2. The third, or centre, marks show when it is in position for filing Rip Saws.



CUT No. 2.

To obtain the correct position, loosen the wing nut and move the guide around to the point desired; after tightening wing nut, loosen screw in file handle, then turn handle until file gives the shape tooth wanted.

A good way is to select a tooth of correct shape and let file down into it, tighten set screw in handle, then file a tooth to see if the shape suits. If not turn the file a little to the right or left and try another tooth until the proper shape is obtained. Then file every other tooth, see cut No. 1; when one side is filed, reverse saw and attachment and adjust as in No. 2, and file the other teeth. For Rip Saws, place the file at right angles with the saw and file every tooth. Always keep the file as nearly horizontal as possible.

This filing guide is sold only attached to our No. 3 Improved Clamp or Vise, and not sold separately. We recommend this as the best saw clamp on the market, being quickly and easily adjusted, and not liable to get out of order.

Write for price including No. 3 Clamp, Filing Guide, File and Handle complete: Packed one in a wooden box.

Henry Disston & Sons, Philadelphia, Penn. INCORPORATED,

Samuel W. Allerton, Pres.

Courtlandt C. Clarke, Sec. and Treas.

Alfred Weed, Vice-Pres. & Gen. Manager.

Arcade File Works.

ESTABLISHED 1842.

Western Office and Warehouse:

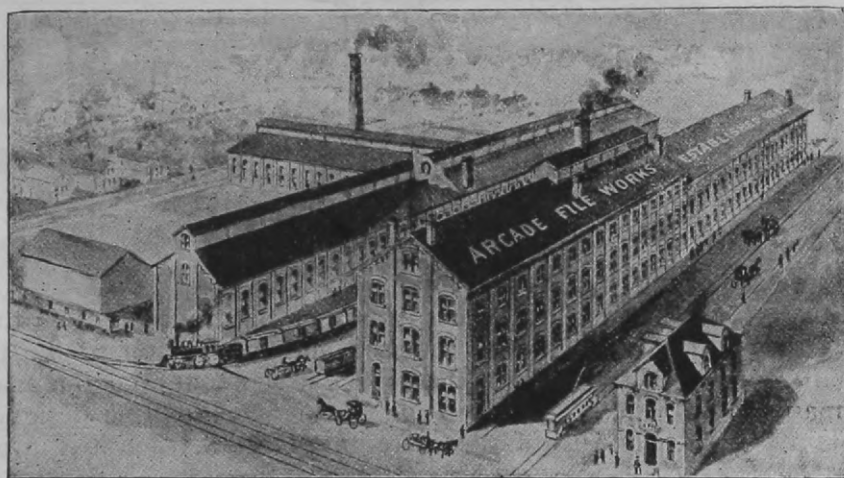
23 Lake St., Chicago, Ill.

Eastern Office and Warehouse:

83 Reade St., New York.

Works: Anderson, Ind.

THE FILES THAT LEAD THEM ALL



FACTS AND SUGGESTIONS

INTERESTING TO

CONSUMERS OF FILES.

WHY THE ARCADE FILES ARE THE BEST.

1st. They are made from an extra grade of Steel.

2d. They are made under improved methods and by machinery recently invented by our General Manager—Alfred Weed. This machinery we control and use exclusively.

3d. The Arcade File Works are the only File Works using **NATURAL GAS**. All steel workers admit the superiority of the **EVEN HEAT** of natural gas. It enables us to secure a superior temper for the Arcade Files.

This fact combined with our improved method of cutting, enables us to produce Files that will cut faster and wear longer than any on the market.

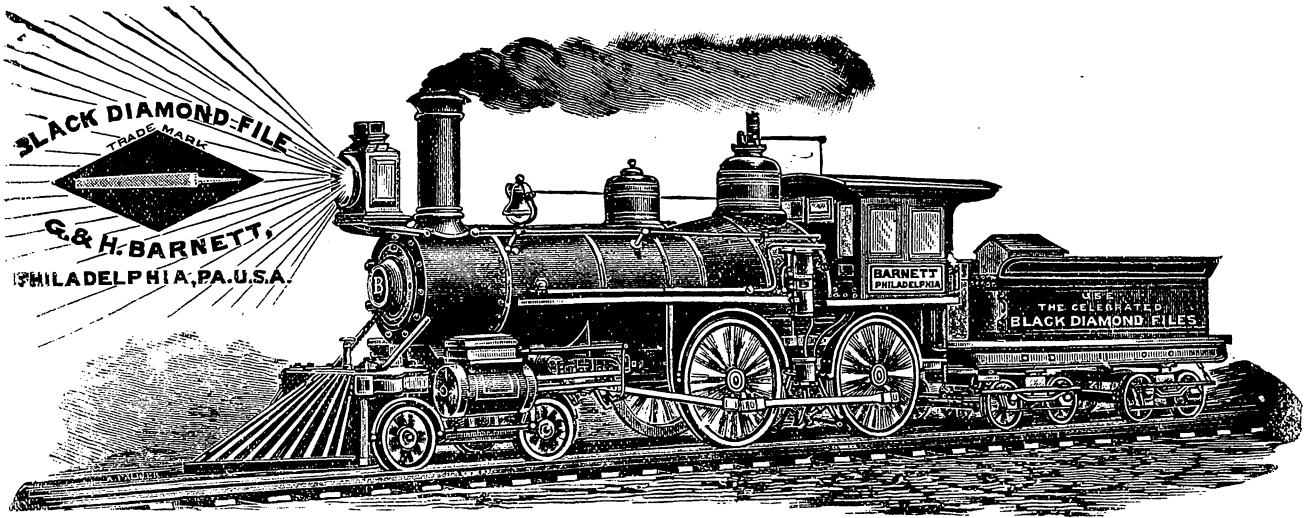
4th. We have recently erected the **BEST EQUIPPED FILE WORKS** in the **WORLD**, and have **ADVANTAGES** possessed by no other concern in our line of business.5th. We have been established since **1842**, and have in our employ only the most experienced and thorough workmen.

6th. The increased demand, the unsolicited letters, and words of commendation from consumers, are sufficient indication to the manufacturers that there is a place for a file of the highest quality, and that they are successfully meeting that demand.

Dealers and consumers make no mistake, practice no false economy in selling and using the Arcade Files.

GUARANTEE.

Every Arcade File is sold with the understanding that it is perfect in every respect, and of superior quality.



THE LARGEST AND MOST COMPLETE FILE WORKS IN THE WORLD.

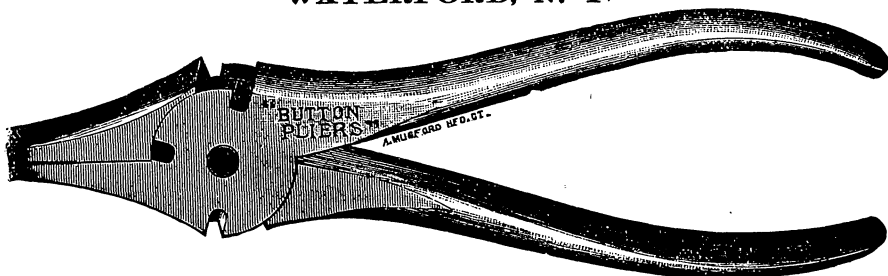
NICHOLSON FILE CO.

PROVIDENCE, R. I.

3000
VARIETIES FILES
[X.F.] AND INCREMENT CUT FILES

J. M. KING & CO.,
WATERFORD, N. Y.

Manufacturers of
BUTTON'S



Pat. Wire Cutter
AND PLIER COMBINED.

Specially Adapted for Use on Wire Fences.

Also Manufacturers of BLACKSMITHS' and
MACHINISTS' STOCKS and DIES, PLUG and
TAPER TAPS, HAND, NUT and SCREW
TAPS, PIPE TAPS and REAMERS.

Price-List on Application.

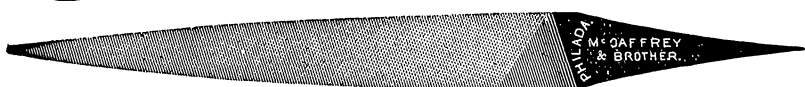
Established by DANIEL B. KING, 1829.

Philadelphia, 1876.



McCaffrey File Co.,
FIFTH and BERKS STS.,
PHILADELPHIA, PA.

For Superiority.



Manufacture and keep in stock a full line of FILES and RASPS only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade.

Superiority acknowledged wherever used, sold or exhibited.

BEST
CRUCIBLE
STEEL.

"TROJAN" HORSE RASPS AND FILES.

LOWEST
IN
PRICE

STRONGEST
TOOTH.

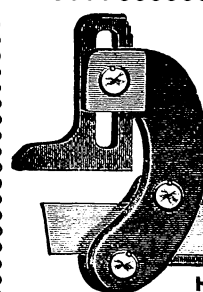
BANKER & WHITE,

TROY, N. Y. LET

(Troy File Works.)

N. Y. Agent GEO. M. MATTESON 111 Duane St.

US
QUOTE.



Improved
Cutting-off
Tool.

SEND FOR CIRCULAR.

HURLEY BROS.

Manufacturers of FINE TOOLS.

Hartford, Conn.

Flint Sharp, Clean,
Carefully Graded.
Low Prices.

CRYSTAL MILLS CO., - Chester, Mass



John Wilson's Butchers' Knives and Steels, Skinning, Sticking, Farriers' & Shoe Knives,

Have established and maintained their reputation, for superiority,
against all Competitors, from

THE YEAR SEVENTEEN HUNDRED & FIFTY,
and are still in increasing demand. As in the past, it is the unalterable
DETERMINATION OF THE HOUSE TO SEND OUT NOTHING BUT WHAT IS OF THE HIGHEST POSSIBLE QUALITY.

WORKS: SYCAMORE STREET, SHEFFIELD, ENGLAND.

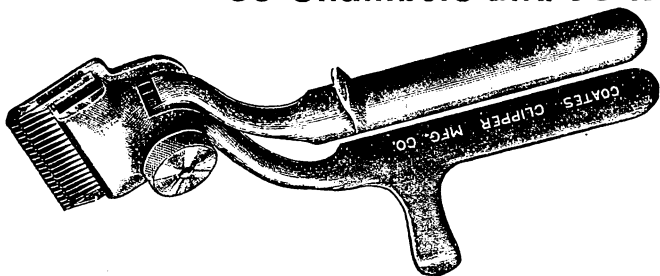
SOLE AGENTS FOR THE UNITED STATES, AND THE CANADAS.

Messrs. Hermann Boker & Co., 101 and 103 Duane St., New York.

ESTABLISHED
1836.

ALFRED FIELD & CO.,

93 Chambers and 75 Reade Streets, New York.



SOLE AGENTS FOR

COATES'

Toilet and Horse Clippers,

Peugeot Frères' French Toilet
and Horse Clippers.

Established 1836.

ALFRED FIELD & CO.,

93 Chambers and 75 Reade Streets,

NEW YORK.

IMPORTERS OF

HARDWARE, CUTLERY, GUNS, ANVILS,
CHAINS, FILES.

SOLE AGENTS FOR

Joseph Rodgers & Sons, Best Cutlery in the
world; W. K. & C. Peace, unrivaled Grass Hooks.
Straw Knives and Scythes; Joseph Elliot & Sons,
Celebrated Razors; Peugeot Frères, "French
Toilet" and other Clippers; L. Hugoniot Tissot,
Fine Steel Pliers, &c.; Eley Bros., Caps, Wads,
Cartridge Cases, &c.; Webster & Horsfall, Steel
Wire of every description.

Send for Rodgers' New Illustrated Catalogue.

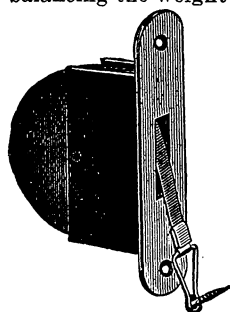
8 YEARS' EXPERIMENTING

Gives us many advantages over all others
in producing the only **Steel Frame Sash
Balance** made in the U. S. It is the most
durable device ever invented for counter
balancing the weight of sash.

**NO POCKETS OR
BOXES REQUIRED.**

Can be used in
old as well as new
houses. Warranted
15 years.

Write for Illustrated
Price-List.



PULLMAN SASH BALANCE CO., Rochester, N. Y.

New York Office, 142 Chambers St.
Chicago Office, 235 Lake St.



THE TRADE acknowledges our
make of **BUTCHERS' STEELS**
THE BEST IN THE WORLD.

FOR CATALOGUES AND PRICE-LISTS ADDRESS

C. & A. HOFFMAN, Manufacturers, FRANKFORD, PHILA., PA.

ESTABLISHED 1816.

WHITE, VAN GLAHN & CO.,

15, 16 and 17 CHATHAM SQUARE N. Y.

Dealers in GENERAL HARDWARE.

SOLE AGENTS IN THE U. S. FOR THE CELEBRATED

J. B. Addis & Sons' Wood Carvers' Tools.

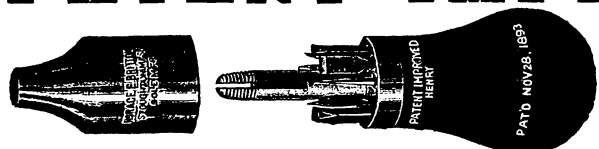
EMPIRE WINDOW SCREENS AND DOORS WITH PATENT FLY ESCAPE.

"Van Glahn" and "Gem" Lawn Mowers, Barb Wire, Green Wire Cloth, Poultry
Netting, Farming Tools, Etc.

WRITE FOR PRICES.

PATENT IMPROVED

HENRY COMBINATION HAFT,



Containing five Brad-Awls, one
Chisel, Screw Driver, Diamond Point
Awl, Marking Awl, Counter Sink,
Tack Puller and Reamer. Send for
Circular of full description and
illustration. If you would have
the Best, get the Patent Improved.
Sent post-paid on receipt of \$1.00.

HORACE E. BRITTON, Patentee and Sole Manufacturer, STOUGHTON, MASS.

HAVE YOU EVER HEARD OF



THE WONDERFUL FORSTNER AUGER BIT ?

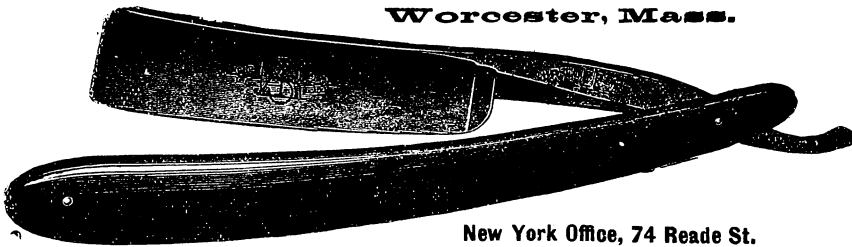
If not, it will pay you to send for a sample 4-8 bit and price-list. Sent on receipt of 55 cents. It will bore
Round, Oval and Square Holes, and cannot be equaled for fine carpentry, cabinet or pattern work. Discount
to dealers on application.

FOR SALE BY ALL HARDWARE DEALERS.
THE BRIDGEPORT GUN IMPLEMENT CO.,
313 and 315 Broadway, New York

Depot for Sales.

J. R. TORREY RAZOR CO.,

Worcester, Mass.



New York Office, 74 Reade St.

Our Razors have become the standard for excellence and are no higher in price than the foreign. We manufacture and carry in stock more than 200 styles. Send for illustrated catalogue.

"Stamped with the BUCK'S HEAD."



TRADE-MARK.

BUCK BROTHERS,
MILLBURY, MASS.

The Most Complete Assortment in the U. S. of
Shank, Socket Firmer and Socket Framing
Chisels, Fine Bevel Edge Chisels, Plane Irons.

TWO PRIZE MEDALS,

No. 1098 and No. 1099, AT WORLD'S FAIR.

Buyers are cautioned against any parties who claim a recent connection (or any connection for over 20 years) with Buck Bros., or who represent goods as our make not stamped with the BUCK'S HEAD or BUCK BROTHERS in full.

1825
R. HEINISCH.1871
R. HEINISCH'S SONS.1892
R. HEINISCH'S SONS CO.**CAUTION.**

TO ALL PURCHASERS OF THE

WELL KNOWN HEINISCH BRAND OF**Shears, Trimmers, Scissors, Tinnern's Snips, &c.**

All Goods of our Manufacture are Stamped

R. HEINISCH

OR

R. HEINISCH

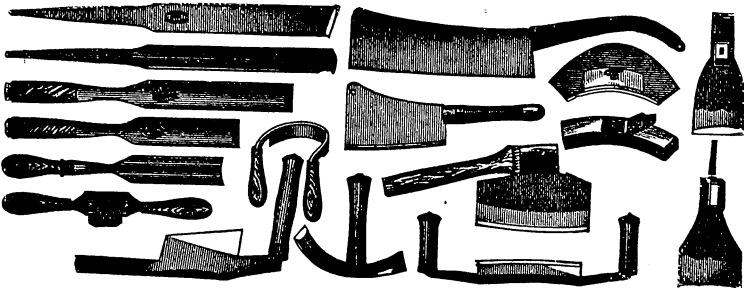
NEWARK, N.J.

NEWARK, N.J.

U. S. A.

NO OTHERS ARE GENUINE.NEW YORK OFFICE AND SALESROOM,
90 CHAMBERS ST.R. HEINISCH'S SONS CO.,
NEWARK, N. J., U. S. A.

HIGHEST AWARD PARIS EXPOSITION, 1889.

ESTABLISHED 1837.
INCORPORATED 1892.**THE L. & I. J. WHITE CO.,**

BUFFALO, N. Y.

MANUFACTURERS
OF**EDGE TOOLS.**Coopers', Carpenters' and Ship Tools, Plane Irons,
Cleavers, &c. Full Line Chisels.

Highest and only award on the complete line of Edge Tools at the World's Fair for Superior Workmanship, Temper and Excellence of Finish was received by

CHARLES BUCK,

sole surviving member of the original firm of BUCK BROS., and proprietor of the

MILLBURY EDGE TOOL WORKS,
MILLBURY, MASS.,

MANUFACTURER OF THE

Genuine Standard Buck Tools.

All kinds of Shank, Socket Firmer Chisels and Gouges, Cut and Double Irons,
S. D. Bits, Etc. Send for Catalogue.

CAUTION.—Buyers wanting the standard Buck Tools, will see that they get only those stamped CHARLES BUCK when ordering from the jobbing houses. Address all correspondence to CHARLES BUCK or the
Millbury Edge Tool Works, - - Millbury, Mass.

Cast Shears.

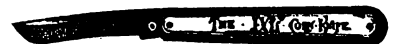
ACME SHEAR CO.,

BRIDGEPORT, - CONN.

MARTEN DOSCHER,**Commission Hardware,**

88 Chambers St., New York.

Agent—G. W. Bradley's Edge
Tools, Axes, Coopers' Tools.
Cleavers, Bush Hooks, Draw
Knives, Ship-Carpenters' Tools,
&c. Also a full stock of Planes,
Brooks' Bright Wire Goods,
Washita Stone, and Taunton
Tack Co.'s Rivets, &c.

**WHEN IN WANT OF
WOSTENHOLM'S****I★XL****Knives or Razors,**

SEND TO

FRED. B. GURNEY,

116 Chambers St., N. Y.

IF YOU WANT THE BEST
FOR CATALOGUE & PRICES
THEIR MAKE IS EQUAL
IF NOT SUPERIOR
TO ANY OTHER
HAVE BEEN IN BUSINESS SINCE 1840.
BOARDMAN & SON
NICKEL SILVER SPOONS
FORKS & C.
EAST HADDAM, CONN.

IF YOU WANT THE BEST
FOR CATALOGUE & PRICES
THEIR MAKE IS EQUAL
IF NOT SUPERIOR
TO ANY OTHER
HAVE BEEN IN BUSINESS SINCE 1840.
BOARDMAN & SON
SILVER PLATED SPOONS
FORKS & C.
EAST HADDAM, CONN.

IF YOU WANT THE BEST
FOR CATALOGUE & PRICES
THEIR MAKE IS EQUAL
IF NOT SUPERIOR
TO ANY OTHER
HAVE BEEN IN BUSINESS SINCE 1840.
BOARDMAN & SON
SILVER PLATED SPOONS
FORKS & C.
EAST HADDAM, CONN.

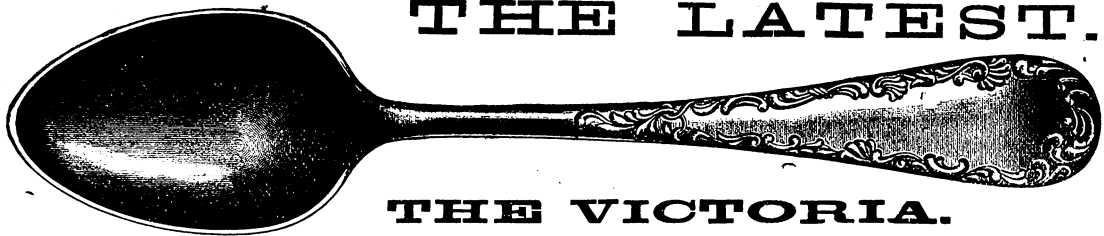
CUTLERY Will mark price &c.,
on cutlery.**ENAMEL** Guaranteed not
to rust.Flows from Pen as readily as ink.
FREE BY MAIL, 50 CENTS.A. B. SHIPLEY & SON, 503 Commerce St.,
Philadelphia, Pa.

— REMEMBER —

WE MAKE ONLY

The Very Highest Grade
OF**MECHANICS' TOOLS.**

H. H. MAYHEW CO., Shelburne Falls, Mass.



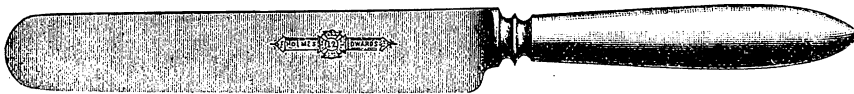
We have a full line of above, which is the neatest pattern ever presented to the trade, and it is stamped



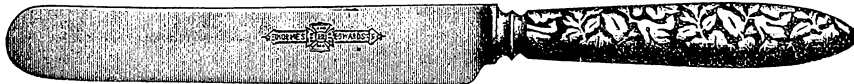
NONE GENUINE WITHOUT THIS TRADE-MARK.

WM. ROGERS MFG. CO., Offices, Hartford, Conn.
 FACTORIES, HARTFORD, CONN., NORWICH, CONN., AND TAUNTON, MASS.

SILVER PLATED KNIVES AT REDUCED PRICES.



WINDSOR. PLAIN HANDLE.



WINDSOR. ARAB HANDLE.

Combination Sets, 6 Knives and 6 Forks, in Satin Lined Case, at same price as Knives.

—SEND FOR PRICES.—

THESE PATTERNS AT SPECIAL FIGURES.

An opportunity for the Hardware Dealer. Offer not repeated this season.

Full 12 dwt. Stamped our name and trade-mark.

THE HOLMES & EDWARDS SILVER CO., — **BRIDGEPORT, CONN.**

NORTHAMPTON CUTLERY COMPANY, NORTHAMPTON, MASS.

NEW YORK
 SALESROOM,



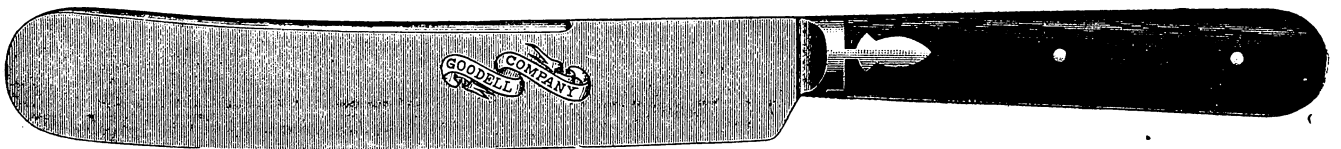
122 Chambers
 Street.

TABLE CUTLERY, BUTCHERS' CARVERS, PLATED GOODS, &c.

MANUFACTURERS OF

Send for Revised Catalogue.

GOODELL COMPANY,
ANTRIM, N. H.



—: MANUFACTURERS OF :—

Table Cutlery, Butcher Knives, Carvers, Shoe Knives, Butcher Steels, &c., &c.

The quality and finish of our goods is unsurpassed. Our prices are suited to the times. Our new catalogue will be ready for distribution April 1st. Send for one if desired.

AGENTS:

THE ALFORD & BERKELE CO., 77 Chambers St., N. Y. City.

HENRY KEIDEL & CO., Baltimore, Md.

A practical means of rapidly reaching absolutely accurate results without the mental wear of computing.

It gives at a glance the net of any sum at a great range of discounts, simple and complex, and it is accurate, rapid and practical. Price, \$3.00; Double Indexed Edition, \$4.00.

Mailed, postpaid, upon receipt of price by DAVID WILLIAMS, 96-102 Reade Street, New York.

LADD'S DISCOUNT BOOK.

DAME, STODDARD & KENDALL,

374 Washington St., Boston, Mass.

IMPORTERS, MANUFACTURERS' AGENTS AND JOBBERS OF FINE FISHING TACKLE.

OUR LEADING SPECIALTIES ARE:

Skinner's Celebrated Fluted Trolling Spoons.

Patent Adjustable Floats and Sinkers.

Bray Fly Books.

"Neverbreak" Split Bamboo Rods.

"Neverbreak" Braided Silk Lines.

Crosby's Hunting Hatchets.

Littlefield's Collapsing Net Ring and Staff,
The Latest and Best Ring on the Market.

SEND FOR OUR NEW CATALOGUE.

THE SAMUEL WINSLOW SKATE MFG. CO.,

Worcester,



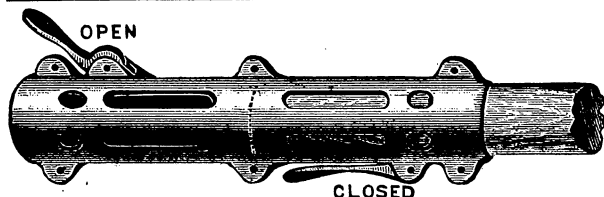
Mass., U. S. A.

The most extensive Skate Factory in the World.

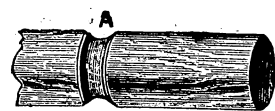


This is a fac-simile of the label on my VULCAN TOOL CO. brand of HATCHETS; a brand for which I have a regular trade in some sections, but to those who have not "caught on"—dealers who are handling an outside brand—I offer a limited quantity at a very low price. Inquiries for price solicited.

FAYETTE R. PLUMB, Philadelphia.



CLOSED



Patent Applied For.

Extension Handle Coupling.

Made entirely of Malleable Iron and cannot break.

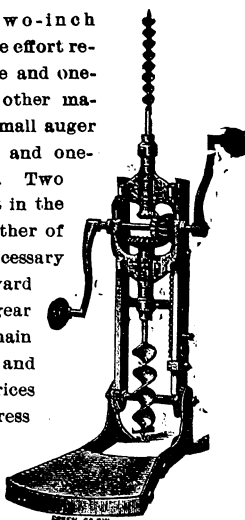
Handles lock in coupling by means of a cam lever and cannot pull out.

For prices and discounts address

THE BOURKE MANUFACTURING CO., Youngstown, O.

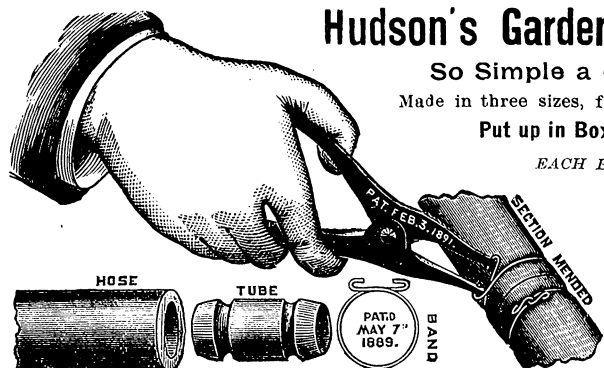
The Boss 2-speed Boring Machine.

Will operate a two-inch auger with the same effort required in using one and one-half inch in any other machine, and for the small auger have a speed two and one-half times faster. Two augers may be kept in the machine, to use either of which it is only necessary to point it downward by first taking the gear frame out of main frame, inverting and replacing it. For prices and discounts address



Buckeye Mfg. Co.

Union City, Ind.



Hudson's Garden Hose Mender.

So Simple a Child Can Use It.

Made in three sizes, for $\frac{1}{2}$ in., $\frac{3}{4}$ in. and 1 in. hose.

Put up in Boxes for Family use.

EACH BOX CONTAINS:

1 Pair Pliers,

20 Bands,

6 Tubes.

Sells readily at 75 cents. Liberal discount to Dealers.

Send for Full Description.

C. E. HUDSON & CO., Manufacturers, Leominster, Mass.

Phillips Screens

FOR DOORS AND WINDOWS, ARE WELL MADE, FROM GOOD MATERIALS BY

A. J. Phillips & Co., Fenton, Mich.



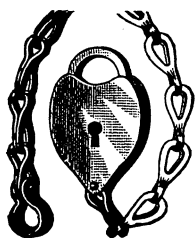
To Make a Bull's Eye

In Your Business or at the Range?

If you deal in ARMS or AMMUNITION or shoot a Rifle, Pistol or Shot Gun, you will make a HIT by sending for the IDEAL HAND BOOK.

IDEAL MFG. CO., New Haven, Ct., U. S. A

Please mention *The Iron Age* when you write.

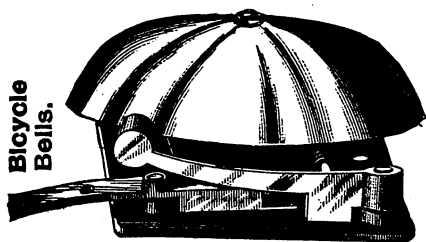


Bicycle Locks. Bicycle Bells.

Especially Low Prices.

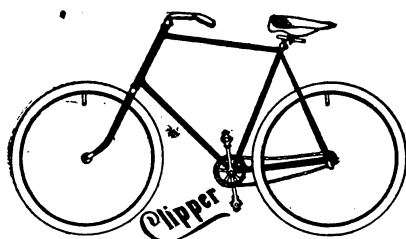
We manufacture hardware specialties of all descriptions to order.

HAINES & ZIMMERMANN, 407 Cherry St., Phila.



BEVIN BROS. MFG. CO., Easthampton, Conn.
Manufacturers of

Sleigh Bells, House, Tea, Hand, Gong Bells, &c.



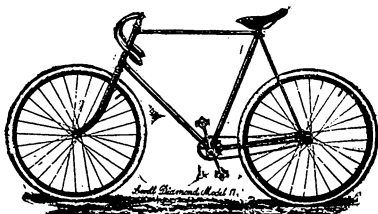
Clipper Bicycles

are built to please the dealer and rider.

Are you in the bicycle business? If not, you can make it pay to handle Clippers. Buy direct from the manufacturer and save the jobbers' profit. It will add considerable to your bank account. We want responsible dealers only. We may be able to interest you, in fact we are sure of it. Our policy is a protective one, and will please you. It protects against Scalpers and "Curb Stone Brokers."

Grand Rapids Cycle Co.,
Grand Rapids, Mich.

LOVELL DIAMOND CYCLES.



RACER-WEIGHT, 19 LBS.

JOHN P. LOVELL ARMS CO., M'f'rs,
BOSTON, - - MASS.

SEND FOR CATALOGUE, FREE TO ALL.

HIGHEST GRADE.

All Sizes and Prices. See our line before you purchase.

All the Latest Improvements.

FULLY GUARANTEED.

AGENTS WANTED.

Do you want to buy Bicycles CHEAP?

If so, write to us for prices on the Falcon No. 1, Falconess, Falcon Junior (boys' bicycle) and Hackney.

THE W. BINGHAM COMPANY,
CLEVELAND, OHIO.

Bicycles!

and
How
To
Make
Money!

A Difficult Problem Answered!

Handle the Reliable and Latest
BICYCLE.

2 SIZES!
No. 1, \$125.00,
Weight, 28 lbs.
No. 2, \$110.00,
Weight, 31 lbs.

The Wellington

Our new catalogue will tell you all about it. Agents wanted, to whom we will allow most liberal inducements.

STOKES MFG. CO., Makers, 295 Wabash Ave., Chicago, Ill.
WESTERN BRANCH OF UNION CYCLE MFG. CO.



SOMETHING NEW!

THE "PERFECTION"

Ball
Bearing
Girls'

Run as easily as Bicycles. Cost about the same as old style parallel bearings. Sold by Hardware and Toy Jobbers. Manufactured by

The Toledo Metal Wheel Co, Toledo, O. Tricycles.

Every Year

the "STERLING" becomes more popular with dealers. They find it gives better satisfaction than any other wheel. No worry over repairs.

THE STERLING
(Built like a Watch.)

A wonderful, strong, light wheel, with a dozen points of superiority over all others. Our "new departure" catalogue (free) tells all about it.

STERLING CYCLE WORKS,
234 Carroll Ave., CHICAGO.

Dog,
Breast,
Sash and Coil,
Martingale,
CHAINS
Staking Out,
Plumbers',
Halter,
Key,

KELLEY & McBEAN, Niagara Falls, N. Y., U. S. A.

A Line of Hardware

Is not Complete Without

MONARCH BICYCLES.

They will make you more money than anything you can handle.

At the World's Columbian Exposition they received a general award for all points, including

Design, Workmanship and Finish.

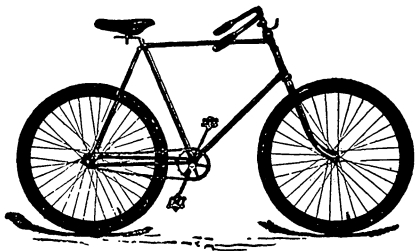
Prices, \$90.00, \$100.00, \$125.00.

Weights, 25 to 34 pounds.

Send for twenty-four page catalogue.

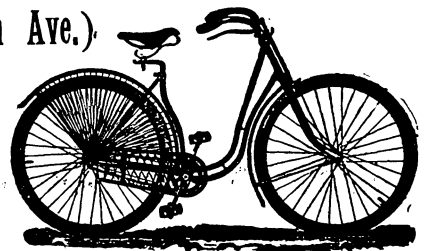
**MONARCH CYCLE CO., Lake & Halsted Sts. Chicago, Ill.**

(Retail Salesroom, No. 280 Wabash Ave.)

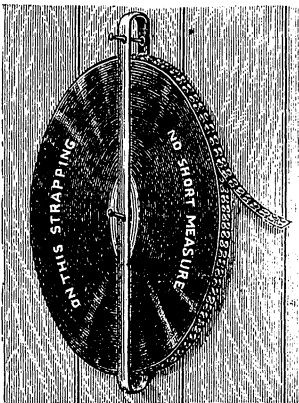
**C. F. GUYON CO.,**

Nos. 97 and 99 Reade St., New York,

Genl. Eastern Distributing and Sales Agents.

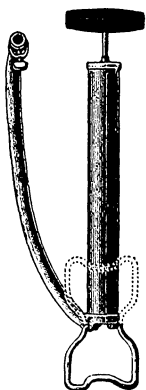


PATENTED IN ALL COUNTRIES.

Showing Reel hung up ready for use.
SIX PATENTS.
Dated: May 14th, 1889; Nov. 25th, 1890.**INJUNCTION NOTICE.****THE U. S. COURT SAYS IN ITS DECISION:**

The defendant admits making and selling Box Straps which clearly contain CARY'S PATENTED INVENTION, although the "Bosses" are shaped differently than those shown in the drawings. "Injunction granted."

All Goods put up in this style to be genuine must bear the name of the **CARY MANUFACTURING CO.**, stamped on each reel.

CARY MANUFACTURING CO., 5 to 9 Elm St., NEW YORK.

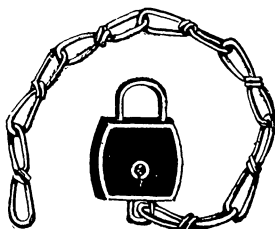
**HEATH'S
BALL VALVE PUMP
AND
UNIVERSAL COUPLING,**
For Bicycle and Sulky Wheels.

The handiest, windiest, strongest pump in the world at any price.

Price \$2.00.

Liberal discount to the trade.

Manufactured by
S. F. HEATH CYCLE CO.,
Minneapolis, Minn.



Keys. Weight complete, 1½ oz. For circular and prices address

W. H. DIEFFENBACHER & CO.,

154 Lake Street, Chicago.

New Design,
Superior Con-
struction in
Self-Locking

**BICYCLE
PAD LOCKS.**

Hardened chain
attached to bot-
tom, making it
adjustable in
length. Two flat

**BUCKEYE
SPRAYING
PUMPS,**

Also **BUCKEYE** Force
and Lift Pumps,
COLUMBIA Steel & Iron
Turbine Wind Engines,
**STEEL DERRICKS, Iron
Fence, BUCKEYE Lawn
Mowers, &c.** Send for circular

**MAST, FOOS & CO., SPRINGFIELD, O.**



The Largest Manufacturers
in the World of

THE NEW YORK SAFETY.
THE IMPROVED HUMPHREY.
THE MANHATTAN, INVALID LIFTS.
CARRIAGE ELEVATORS, ETC.

DUMB WAITERS AND HAND POWER ELEVATORS.

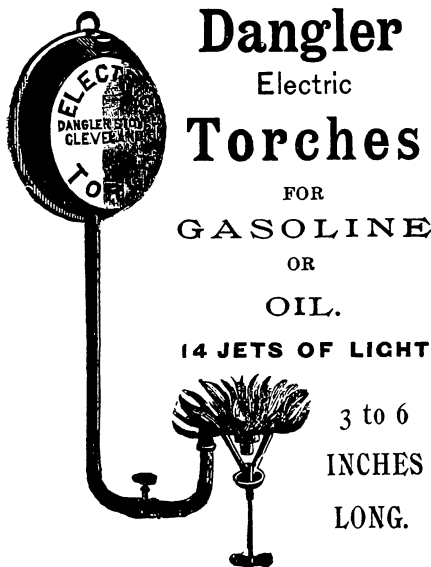
SEND FOR CATALOGUE.

THE STORM
MANUF'G CO.
NEWARK, N. J.

Many thousands of our
Machines in use all
Over the World.

SOLE MANUFACTURERS' AGENTS,

JOHN H. GRAHAM & CO., } 113 Chambers St.,
NEW YORK.



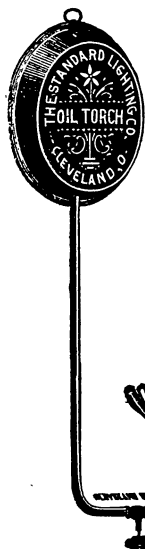
FOR lighting manufacturing establishments, such as Rolling Mills, Foundries, Machine Shops, Engine Rooms, &c., &c., with a convenient, portable, brilliant, steady light, and by cheaper means than by Coal Gas

SOLE MANUFACTURERS,

The Dangler Stove & Mfg. Co.,
Cleveland, Ohio.

LIGHT YOUR DARK SHOPS CHEAPLY.

Give your men plenty of Light and they will do double work.



The Wall Torch has been used for several years as a means of illumination in Mills, Foundries, Machine and Car Shops, Tunnels, Street Stands, Band Stands, Smith Shops, etc.

While there are many cheap, inferior torches made which injure the sale of a good article, and condemn the Torch in general, our "Incandescent" Wall Torches are recognized as the best, and are now in use in the largest manufacturing establishments in the country giving PERFECT SATISFACTION, as is evidenced by the DUPLICATE ORDERS we receive from year to year.

They burn 150° Coal Oil, or 74° Naphtha, requiring a different burner for each.

In ordering be careful to state which is desired.

Price, for Single Torch, complete, \$2 each.

SPECIAL PRICE QUOTED FOR QUANTITIES.

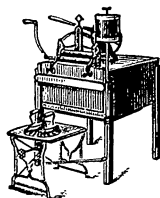
THE STANDARD LIGHTING CO.,

100 to 118 Perkins Ave.,

- - - Cleveland, Ohio,

PHILLIPS SCREENS

Are Reliable.



WASHING DAY.

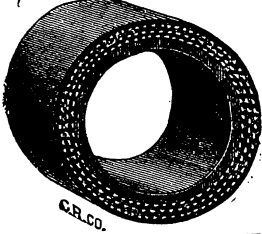
The saddest of all the year,
It brings no rest, it brings no cheer.

But the "Columbian" (Self-Heating) Washer and Stove Combined makes "Washing Day" as good as the others of the week. Does away with all lifting, and being around a hot stove. Washes and boils the clothes at the same time. A wonderful seller.

SEND FOR A SAMPLE.

BENBOW MFG. CO., - St. Louis, Mo.

NEW SEAMLESS TUBE



SALES OF

Over Two Million Feet

—OF—

GARDEN HOSE

alone during the past year, distributed throughout the United States, and not a single piece complained of, justifies us in guaranteeing that it will give absolute satisfaction.

Who Has Not Had Bad Hose?

Who has not lost time, patience, money, by attempting settlement for such goods?

THE CAUSE in nine cases out of ten is the lapped seam.
THE REMEDY is in buying our

PATENT SEAMLESS TUBE HOSE,

made by machinery, the tube run like lead pipe, through a die. There is no lapped tube, no seam, no cracks, no defects: water cannot get through to rot the duck and cause the hose to burst.

Made in All Sizes and Kinds of Garden, Engine, Steam, Fire, Brewers' Cotton Hose, &c.

Order a Sample Bale of our Seamless-Tube Hose—Best in the World, costs no more than ordinary lapped-seam hose. The different colors, Red, White, Black, Green and Yellow, make a fine window or sidewalk attraction.

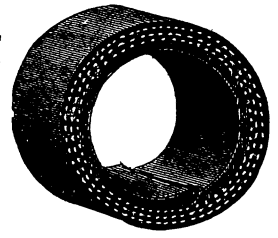
CLEVELAND RUBBER WORKS

of the Mechanical Rubber Co.,

CLEVELAND, O.

Makers of Mechanical Rubber Goods, Clothing, Druggists' Sundries, Specialties, Etc.

'OLD LAPPED TUBE'



We were awarded an order of 25,000 ft. for World's Fair

of our celebrated

Seamless-Tube
COTTON RUBBER-LINED HOSE.

We Want Your Trade.
Send for 60-page Catalogue.
Write for Prices and Samples.

Warranted Better than the Best ENGLISH ANVIL

Face in one piece of BEST TOOL CAST STEEL, PERFECTLY WELDED, perfectly true, of hardest temper, and never to come out or "settle." Horn of tough untempered steel, never to break or bend. Only Anvil made in the United States fully warranted as above.

FISHER DOUBLE-SCREW VISE

IS FULLY WARRANTED STRONGER THAN ANY OTHER LEG VISE, AND ALWAYS PARALLEL. Is the best Vise for Machine Shops and Blacksmiths, and for all heavy work. ACCURATE AND DURABLE. Send for Circular.

EAGLE ANVIL WORKS,

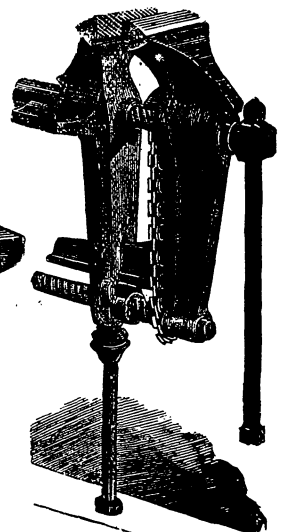
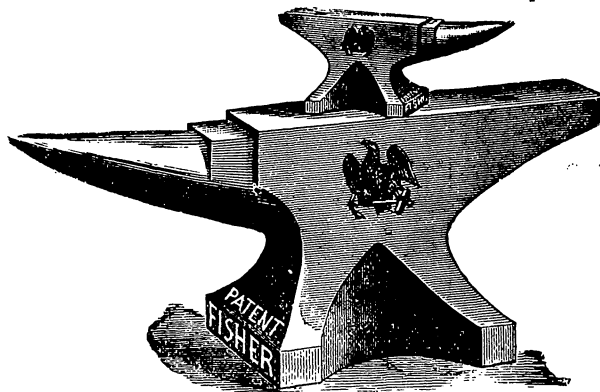
Trenton, N. J.

Sold in New York by our Agents, J. C. McCarty & Co., 97 Chambers St., The Russell & Erwin Mfg. Co., 45 Chambers St.

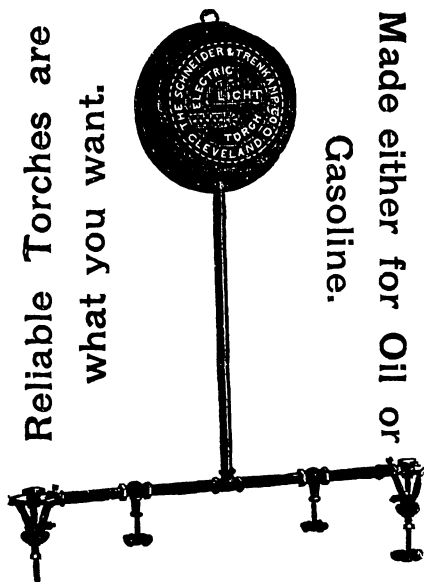
ESTABLISHED 1843.
MORE THAN 200 DIFFERENT PATTERNS.

None Genuine without our Trade-Mark.

EAGLE and "FISHER" Stamp.



Reliable Torches are
what you want.

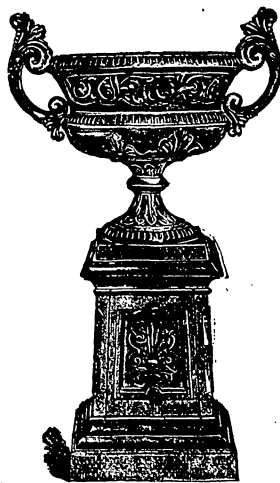


These Torches are particularly adapted for use in Factories, Foundries, Machine Shops, Rolling Mills, Blacksmith Shops, Warehouses, &c. They make a strong white light, are free from smoke and are not affected by wind or rain. They are convenient and portable. These Torches can be run at an expense of about one-half cent to one cent per hour, burning a bright, steady light which is ten times greater than the light of an ordinary gas burner.

Write us for prices. A liberal discount given to the trade.
Manufactured by
THE SCHNEIDER & TRENKAMP CO.
Nos. 479 to 497 Case Ave., Cleveland, Ohio.

Made either for Oil or
Gasoline.

IRON RESERVOIR VASES.



Nearly 100
styles and
sizes.

List prices
from \$6.00
to \$100.00
each.

These Vases are made with a reservoir for water, from which a constant and even supply of moisture is drawn by capillary attraction, and they do not need watering oftener than once in ten or fifteen days. Thousands of Reservoir Vases are in

use on lawns and in cemeteries all over the country. Our prices are no higher than those of ordinary vases.

Catalogue sent on application.

WALBRIDGE & CO.,

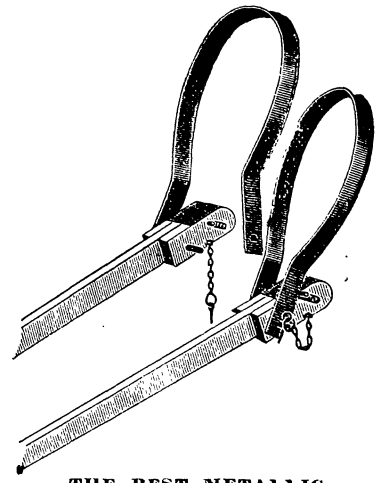
BUFFALO, N. Y.

BISHOP'S

IMPROVED

STEEL MONARCH.

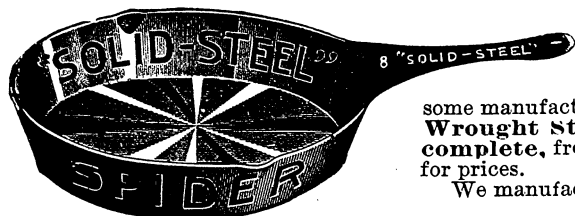
PATENTS PENDING.



THE BEST METALLIC HORSE POKE.

The only Poke having a tempered Steel Bow of perfect shape. Will stand severe service, being strongly built in every part. Prices reasonable. Ask your Jobber for them.

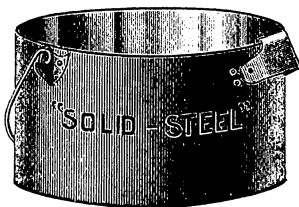
A. W. BISHOP, MAKER,
BEREA, OHIO.

"SOLID-STEEL" SEAMLESS HOLLOW WARE.**Brilliant Finish.**

No Seams, no Rivets in "Solid-Steel" Ware.

Notwithstanding the claims made by some manufacturers' agents our spiders are made from Wrought steel, Without Seams or Rivets complete, from a single piece of metal. Write for prices.

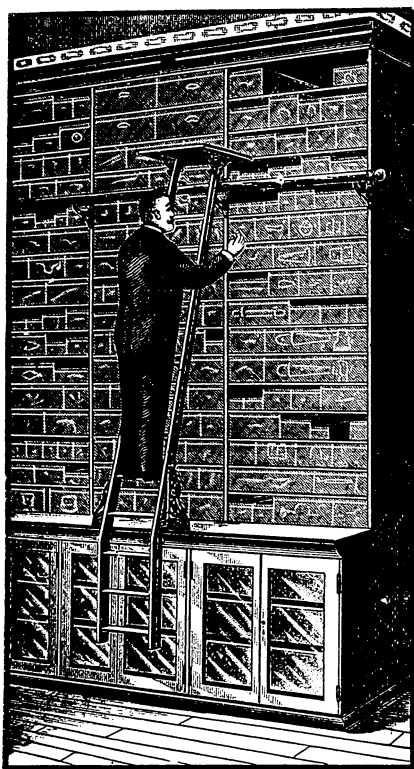
We manufacture our own goods.



"Solid-Steel" Maslin Kettle.

The Cleveland Stamping & Tool Co., Cleveland, O.

We do Light and Heavy Stamping and Blanking. Also build Dies and Stamping Machinery.

**THE BICYCLE STEP LADDER.**

Highest Award, Columbian Exposition.
The Newest, Neatest, Simplest, Easiest Operated and Safest Store Ladder made.

Ladders are not Suspended, but Supported from below on wheels. Move easier with operator on than others when empty. Highly finished, and very handsome. Made in different grades and prices to suit. Send for illustrated catalogue and prices.

See this space next week for other styles.

The Bicycle Step Ladder Co., 50 State Street, Chicago, Ills.

—: OUR:—

**PURE ALUMINUM COOK-
ING UTENSILS**

Meeting with such universal appreciation, we think it to our interest to appoint ONE responsible firm of Hardware Merchants in EACH town and city as our sole agents.

**ILLINOIS PURE ALUMINUM CO.,
LEMONT, ILLINOIS.**

Manufacturers of Sheets, Medals, Utensils.

HOWARD IRON WORKS,

BUFFALO, N. Y.,

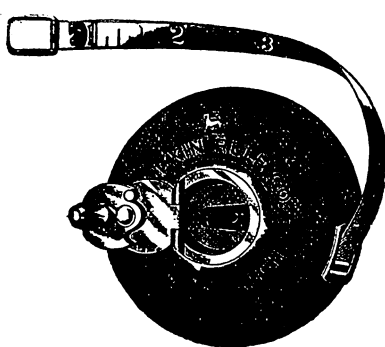
Manufacturers of

BOLT CUTTERS

AND NUT TAPPING MACHINES,

(Schlenker's Patent),

Send for Illustrated Catalogue.

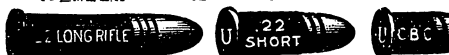
**"RELIABLE"
Steel Measuring Tapes.**

Entirely new. Handle or crank when closed is perfectly flush with leather case. Opens by pressing button on opposite side and folds out double, giving increased leverage. Best and most convenient steel tape on the market. Fully guaranteed. Will send samples on approval. We carry a complete stock of our goods at our New York Office, 20 Murray St.

LUFKIN RULE CO., Saginaw, Mich.

**A Triumph in Small Bore Rifles.
STEVENS' "FAVORITE" RIFLE.**

15 SHOTS AT 40 FEET. 10 SHOTS AT 40 FEET. 10 SHOTS AT 40 FEET.



MADE FOR THE 22 OR 25 RIM FIRE CARTRIDGE.



WEIGHT, 4 1/2 POUNDS.

22-INCH BARREL.

LEVER ACTION LIKE SHARPS.

TAKEN APART IN TEN SECONDS.

IT IS SIMPLY IMPOSSIBLE

TO MAKE MORE

ACCURATE SHOOTING BARRELS

THAN ARE ON THIS RIFLE.

NO. 17. Plain Open Sights.....\$12.50

NO. 18. Vernier, Open Back, and Beach Front Sights..... 17.00

NO. 19. Lyman Peep, Open Back, and Lyman Front Sights, 17.00

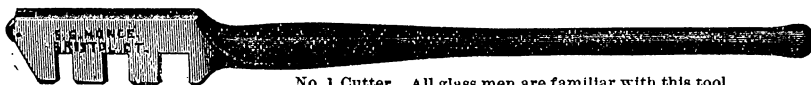
A 60 Page Catalog showing our full line of Fire Arms with TRADE PRICE LIST sent with pleasure to all dealers.

J. Stevens Arms & Tool Co.,

P. O. Box 5729.

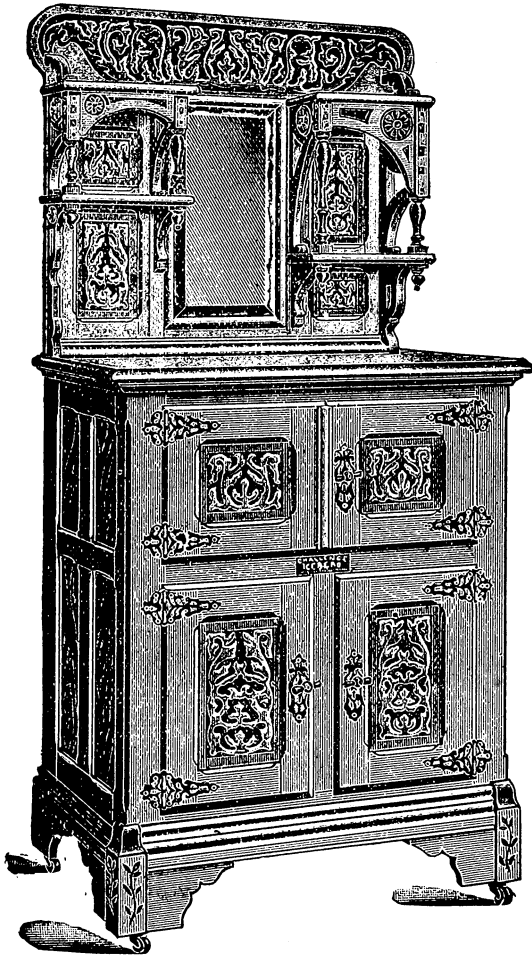
Chicopee Falls, Mass. U. S. A.

MONCE'S NOVELTY GLASS CUTTERS. — INTERCHANGEABLE LOCK STENCILS,



No. 1 Cutter. All glass men are familiar with this tool.

S. G. MONCE, — BRISTOL, CONN.



BUY THE BEST. THE Challenge Iceberg Refrigerators,

MANUFACTURED BY

The Challenge Corn Planter Co.,

Grand Haven, Mich., U. S. A.

Write for our large Illustrated Catalogue for 1894.

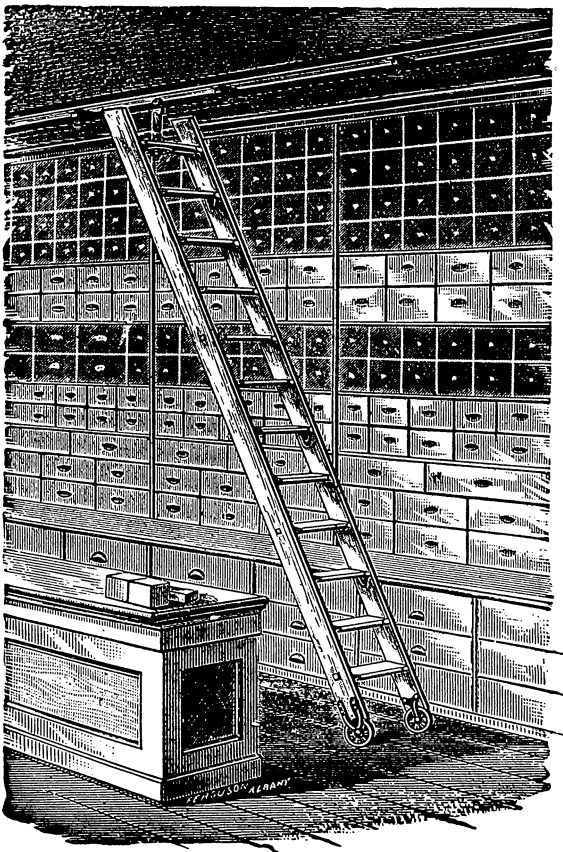
All our goods are made of thoroughly kiln dried ash, finished in antique with shellac and coach varnish. Panels are beautifully hand carved. Trimmings are of solid bronze and are our own pattern. We use our own patent air tight locks, patent self-retaining malleable casters and floor plates, and patent drip cups. All refrigerators are filled with pure charcoal. The Challenge Iceberg Refrigerators are the best made for preserving all articles stored therein pure and sweet, as there is always a circulation of pure, dry, cold air. Refrigerators having water coolers are provided with bronze faucet and cup holder. All Sideboards have a fine beveled French plate mirror. We manufacture Refrigerators of all sizes from the ordinary Ice Chest to the largest sizes for grocers' and butchers' use, including the most elegant line of Dining Room Sideboard Refrigerators ever put on the market.

GENERAL AGENTS:

F. T. Witte Hardware Co., New York, N. Y.
D. W. Cushing, Boston, Mass.
F. M. Borden & Bro., Phila., Pa.
Simmons Hardware Co., St. Louis, Mo.
Buhl, Sons & Co., Detroit, Mich.
Kent & Stuchfield, Denver, Col.
Chicago Stamping Co., Chicago, Ill.

Lee-Clarke-Andreesen Hardware Co., Omaha, Neb.
John Pritzlaff Hardware Co., Milwaukee, Wis.
A. Baldwin & Co., New Orleans, La.
Gurney Refrigerating Co., Oakland, Cal.
Wm. Miller Range & Furnace Co., Cincinnati, O.

THE "NOISELESS" STORE LADDER.



The latest and best. Perfectly noiseless. Neat in appearance.

Manufactured by

M. CROISSANT,
ALBANY, N. Y.

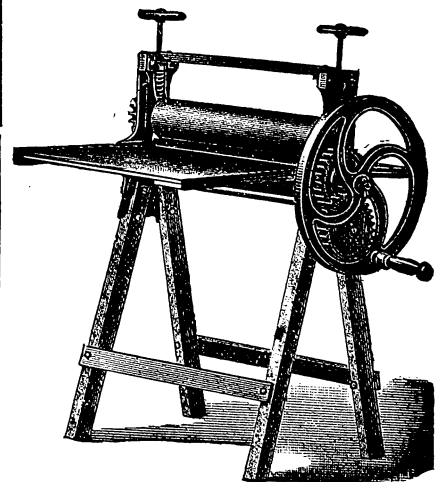
The Family Mangle.

WARRANTED TO DO

Better Work than Hand-Work.

SAVES all the fuel,
two-thirds the work.
Keeps the linen whiter.

We Guarantee Every Machine.

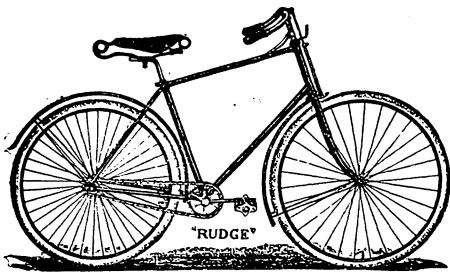


Send for descriptive circular to
S. C. Johnson, Racine, Wis.
Agents Wanted.

THOMAS CLARKE
HARDWARE AND GENERAL AGENT.

(FIRST-CLASS REFERENCES.)

60 PRINCE WILLIAM ST., ST. JOHN,
NEW BRUNSWICK.



HARDWARE DEALERS AND RUDGE CYCLES.
Agents wanted immediately for unoccupied territory. Write for illustrated catalogue and Price-list of 1894 Wheels.

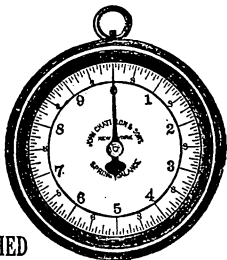
The Bronson Supply Co.,

Sole Agents for the United States.

72 Beekman St., New York.

John Chatillon & Sons,

85, 87, 89, 91, 93 CLIFF ST., NEW YORK.



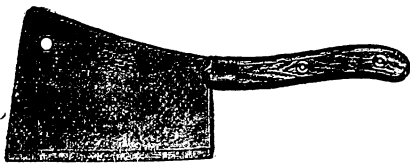
ESTABLISHED
1835.

SEND FOR
PRICE-LIST.



Sole Agents for

Foster Bros.' Butchers' Cutlery.



John Chatillon & Sons. N. Y.



THE
KNAPP & COWLES
MFG. CO.,
Bridgeport, Conn.,
Makers of a large line of
STANDARD
Hardware Specialties.
SEND FOR
K Catalogue.

AMERICAN TOOL COMPANY,
NEW YORK,
MANUFACTURERS OF
TOOL CHESTS

Of all sizes, complete with tools, for Hardware, Toy,
Notion and Variety trades.
Factory and Salesroom,
200 West Houston Street, near Varick.
Also Machinists' Tool Chests, empty. Illustrated Cata-
logue and prices furnished on application.



No. 3

Globe Street Lamp.

Light your Streets and Driveways.

The S. G. & L. CO.

**Tubular Globe
Street Lamp**

IS THE Best Street Lamp Manufactured.
Equal to the best Gas Light.
Will not Blow Out in the Strongest Wind.
Will not Smoke.
Will not Freeze.
Automatic Extinguisher.
Outside Wick Regulator.
Will Burn Four Hours for One Cent.

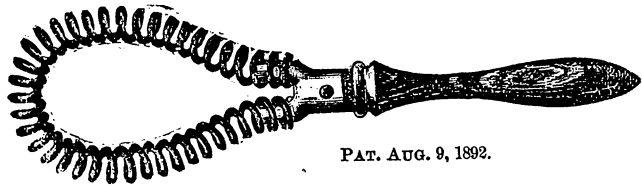
MANUFACTURED BY

STEAM GAUGE AND LANTERN CO.,

SYRACUSE, N. Y.

Western Branch, 25 Lake St., Chicago, Ill.

THE BOSS DUST BEATER.



PAT. AUG. 9, 1892.

NEAT, DURABLE, AND DOES THE BUSINESS.

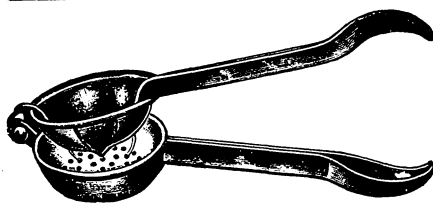
For removing dust and filth from Clothing, Upholstered Furniture, Rugs and Carpets it is just the thing. Will raise the nap and so improve the appearance. Will not, like other Dust Beaters, leave marks, nor tear the fabric. The coil is of steel wire secured in a malleable iron socket and attached to an enameled wooden handle. Just what everybody wants.

Sent by Mail, 35 Cents.

PEABODY & PARKS,

Manufacturers,

TROY, N. Y.



Do you make Lemonade?

If so you want our Squeezer. Positively the best. Suitable for any size Lemon. Write for catalogue and prices.

BERGER BROS., 237 Arch St., Philadelphia, Pa.

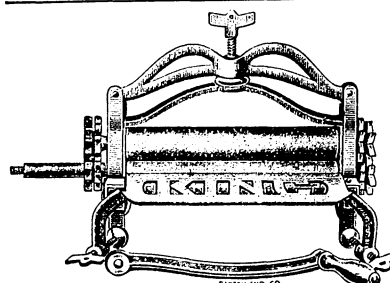
COLBY WRINGER CO., - Montpelier, Vt.

MANUFACTURERS OF THE

PREMIUM WRINGER,

With Automatic Apron Adjustment.

SURPLESS, DUNN & ALDER, DIRECT REPRESENTATIVES,
97 Chambers Street, New York.



We are sole manufacturers of the celebrated

Erie and King Wringers.

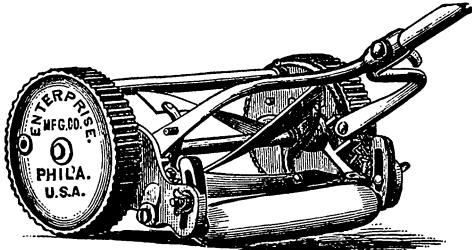
We also make all other brands of Wood and Iron Frame Wringers.

Exclusive sale of Erie and King Wringers given to one dealer in each town.

WRITE FOR CATALOGUE.

The National Wringer Co., Canton, O.

THE ENTERPRISE M'FG CO. OF PA., Third and Dauphin Sts., Philadelphia, U. S. A.

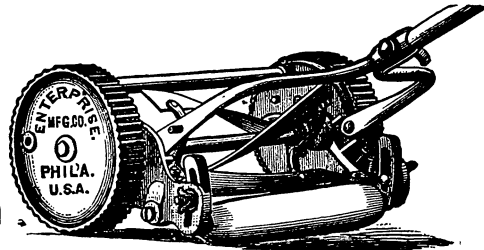


7, 9, 11, 13, 15 inches.

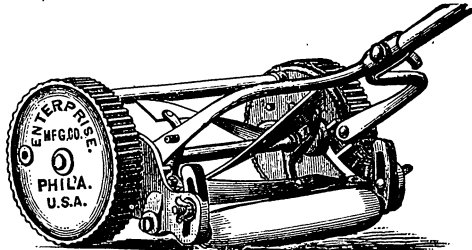
PAINTED

and

TINNED.

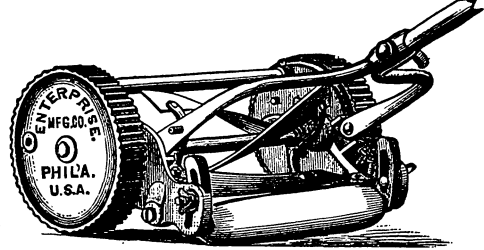


ENTERPRISE LAWN MOWERS!



EQUAL TO
the
BEST.

Prices quoted
on Application.



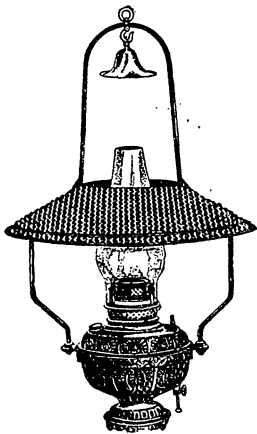
FOR SALE BY THE HARDWARE TRADE.

Branch Office and Warehouse with J. C. McCarty & Co., 97 Chambers Street, New York City.

SEND FOR CATALOGUE, FREE.

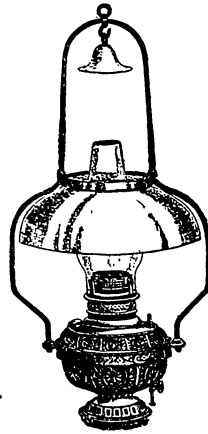
THE LAMP TO LIGHT YOUR STORE.

MAMMOTH CENTRAL DRAFT BANNER.



No. 858. Size 3.

Enlarged Oil Pot
No Smoke.
No Smell.
Cheaper and Better than Gas.
300 Candle Power.
Holds One Gallon Oil.
Burns Brightly about 10 hours.



With 20-inch Tin Shade.

With 14-inch Dome Shade.

The Banner is the only Fount having Extra Feeder Wick which supplies oil to the Burning Wick. Harp has our Patent Extension Band, allowing Fount to pass down and through instead of lifting over as in the old style harp. Flame is regulated by our Improved Ratchet Movement. This Movement gives an exactness and nicety in adjusting that is not possible in any other wick raising device.

—MANUFACTURED ONLY BY—

THE PLUME & ATWOOD MFG. CO.,
NEW YORK. BOSTON. CHICAGO.

SICKELS, SWEET & LYON,

Wholesale Hardware.

Office, 35 Barclay St. Warehouse, 40 Park Place, New York.

Carry Stock of Jackson, Mich., Farming Tools

Shipments from Factory if preferred.

N. Y. AGENTS FOR

Cortland Door and Window Screen Co., Union Steel Screw Co., Eagle
File Co., Perfection and New Easy Lawn Mowers.
Spring Catalogue No. 7 issued in February.

BOOKS

YOU CAN OBTAIN PROMPTLY the latest
work on any subject in which you are interested
by addressing DAVID WILLIAMS, Publisher
and Bookseller, 96-102 Reade Street, New York.

"Washing Done,"

Thoroughly well done, and done quickly as well, in the

..Columbia Washer..

This Machine illustrates in combination a simple and effective mechanism, all metallic parts of which are heavily galvanized, and a body of selected Virginia White Cedar, of all woods the one least affected by contact with water.

Seasoned White Cedar frequently lasts one hundred years, whereas the buyers of Washing Machines very seldom do, consequently the purchaser of a Columbia Washer secures in it an heirloom for the next generation.

We shall be pleased to send you full details of the Columbia Washer.

THE "LIFE"

of a PAIL or TUB is simply that of the hoops holding its staves together, and its constitution is hopelessly shattered simultaneously with any impairment of the aforesaid hoops.

We are now making solid nonbreakable hoops of heavy wire, viz., the

Electric-Welded Wire Hoop, which is practically indestructible, and are applying such to our Best White Cedar Ware in a manner that renders it vastly superior to all other forms of construction. These Welded Hoops are imbedded, by a patented process, in grooves prepared for them on the outside of the vessel, and they grip the staves with a firmness that time and wear are alike unable to relax. As in the case of the Columbia Washer, the "Pale Messenger" will probably overtake most purchasers of these goods with a serviceable article still in use. Send for Circular.

Richmond Cedar Works,
RICHMOND, VA.

American Stamping Co.,

Manufacturers of

All Kinds of Tinware and Sheet
Metal Goods.

N. Y. Office and Salesroom, 104 & 106 John St.
Factory, 103 to 119 N. 3d St., Brooklyn, E. D., N. Y.

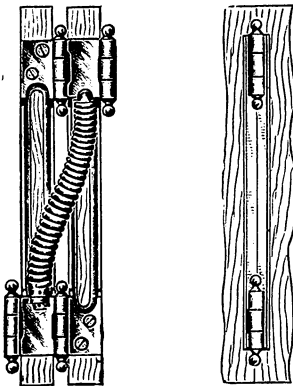
THE SCHULTZE LOCK UNPICKABLE.



SEND FOR CIRCULAR.

MANUFACTURED ONLY BY

The Schultze Mfg. Co.,
Cor. Emerald & Wishart Sts., Phila., Pa.



Highest Award, World's
Columbian Exposition,

— ON —

SPRING BUTTS.

For Catalogue and Prices Address

CHICAGO SPRING BUTT CO.

CHICAGO, ILL.,

Or 97 Chambers Street, N. Y.

ACME CUTTING TOOLS

Made in all Sizes.



SOLID STEEL ACME PLIER
AND WIRE CUTTER.
Made with cutters of best steel.

Jaws of choicest Tool Steel dove-
talled into the head, making it as
strong as solid steel.

ACME CUTTING NIPPER.



HIGGANUM HARDWARE CO., HIGGANUM, CONN.

New York Office, 18 Cliff Street.

Phillips Screens

FOR DOORS AND WINDOWS, ARE WELL
MADE, FROM GOOD MATERIALS BY

A. J. Phillips & Co., Fenton, Mich.

McKINNON DASH & HDW. CO.,

LIMITED, Manufacturers of

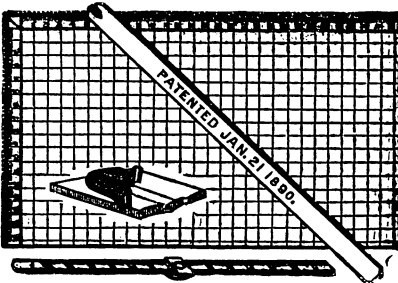
FINE QUALITY
DASHES

AND

FENDERS,

SURREY DASH.

BUFFALO. - N. Y.



The Canton Glass Board.

Cuts any Fraction of an inch by Eighths.

Unequaled for accuracy and quick work in cut-
ting square or at any angle. Saves breakages, &c.

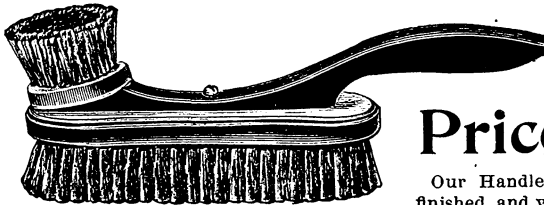
— ALSO —

IMPROVED TRAMMEL RULE for Cutting Circles

From 3 inches up to 48 inches, Segments,
Gothic Shapes, &c.

Send for Circular.

The Canton Saw Co., Canton, Ohio.



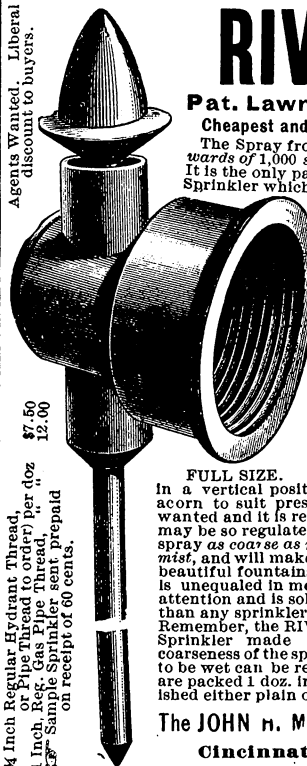
Brushes And

Prices to suit the trade.

Our Handled Shoe Brushes are handsomely
finished and very salable. No nails. Handles and
Top Knots are screwed on.

THE BROMWELL BRUSH & WIRE GOODS CO.,

CINCINNATI, O.



RIVAL

Pat. Lawn Sprinkler

Cheapest and Best in Use.

The Spray from it covers up-
wards of 1,000 sq. feet of lawn.
It is the only patent adjustable
Sprinkler which is adaptable to

any water
pressure. Be-
ing made of
brass, and hav-
ing no mov-
ing parts to
wear out, or
small openings
to clog up, it
can be oper-
ated with san-
dy or muddy
water as well
as clear, and
will last for
years. To oper-
ate, screw
Sprinkler on
end of hose,
stick thereto in
the ground

FULL SIZE.

In a vertical position, adjust the
acorn to suit pressure and spray
wanted and it is ready for use. It
may be so regulated as to throw a
spray as coarse as rain or as fine as
mist, and will make one of the most
beautiful fountains imaginable. It
is unequalled in merit, requires no
attention and is sold at a less price
than any sprinkler in the market.
Remember, the RIVAL is the only
Sprinkler made by which the
coarseness of the spray and the sea-
son to be wet can be regulated. They
are packed 1 doz. in a box, and
finished either plain or nickel plated.

The JOHN H. MCGOWAN CO.

Cincinnati, Ohio.

Agents Wanted. Liberal
discount to buyers.
\$7.50
12.00
1/4 Inch Regular Hydrant Thread,
or Pipe Thread to order, per doz
1 Inch Reg. Gas Pipe Thread,
Sample Sprinkler sent prepaid
on receipt of 60 cents.

JOHN LOYD,

Machine Knives, Shear Blades,
Presses and Dies.

Nos. 558 to 562 Water Street, New York.

Law without Lawyers.

A Compendium of Business
and Domestic Law for
Popular Use.

By H. B. COREY,

Member of the New York Bar,

PRICE, \$1.00. Post-paid.

A simple, clear and accurate presentation
of the general laws, and of the laws of the
several States relating to the rights of prop-
erty, contracts, debts, partnerships, bank-
ruptcy, insurance, corporations, marriage,
divorce, &c., &c., with which are included
correct copies of all legal instruments and
forms, such as notes, deeds, mortgages, leases,
wills, &c., and a dictionary of legal words
and phrases.

Sent, post-paid, on receipt of price by

DAVID WILLIAMS,

Publisher and Bookseller,

96-102 READE ST., - NEW YORK



INTERCHANGEABLE
LOCK-CORNER SHELF BOXES,
Screw Cases, &c.,
FOR THE HARDWARE TRADE.

A. H. GREEN,

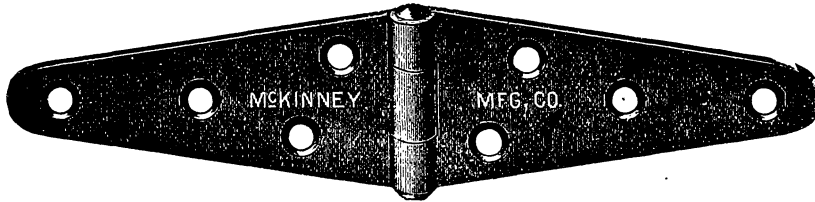
22 Park Place, New York.

STEEL HINGES AND BUTTS.

STANDARD GOODS.

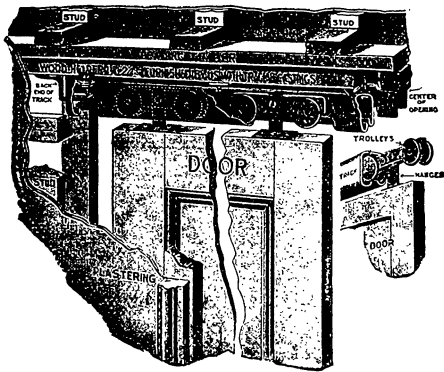
McKINNEY MFG. CO. - ALLEGHENY, PENN.

SEND FOR
LIST.



ORDERS FILLED
ON SIGHT.

"NONE BETTER."



PARLOR DOOR HANGERS

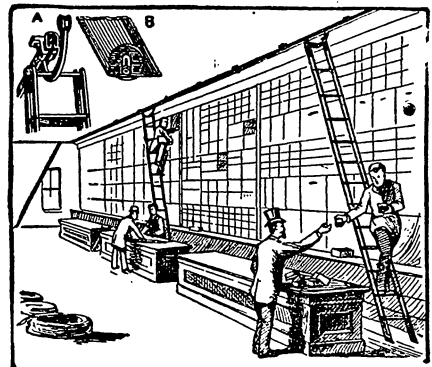
The adjustment is in the Track and not in the Hanger, as in other fixtures.
Track can be taken out of Pocket and replaced without defacing walls after house is finished.

HIGHEST AWARD
AT WORLD'S FAIR 1893.

Parlor, Barn and Fire Door Hangers
SEND FOR CATALOGUE.

COBURN TROLLEY TRACK MFG. CO.,
HOLYOKE, MASS.

We make four styles of Rolling Ladders to reach shelving of any height.



P. & F. CORBIN,

New Britain, Conn.

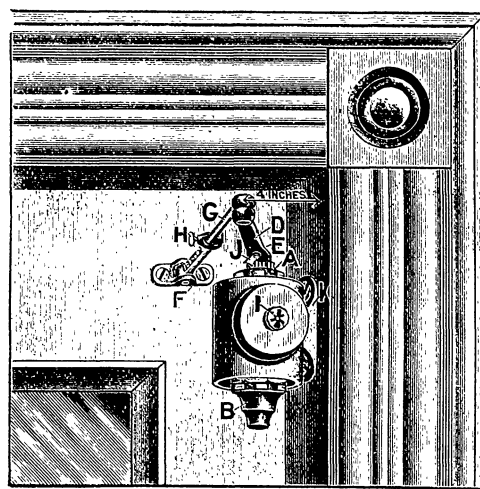
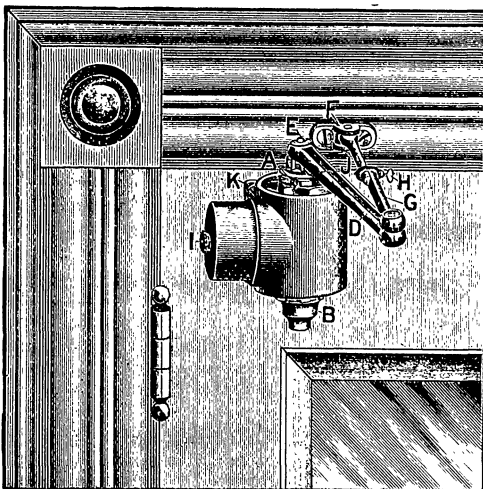
New York.

Philadelphia.

Chicago.

—) MANUFACTURERS OF (—

Easily
Adjusted
and Adapted
for all
Requirements.

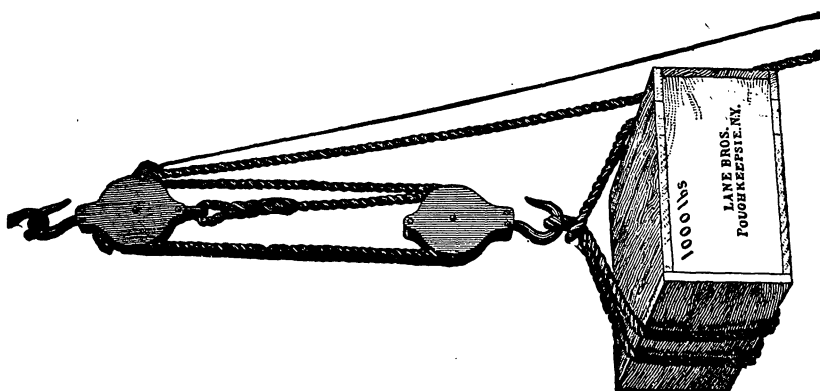


Looks Well,
Acts Well,
Wears Well.

LIQUID DOOR CHECKS AND SPRINGS,

Fine Builders' Hardware. Wood and Machine Screws.

Catalogues and Prices Furnished on Application.



LANE'S SELF-LOCKING TACKLEBLOCKS

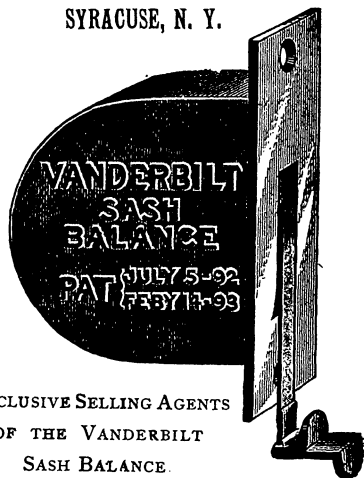
Anti-Friction Steel Bushings,
Holds the load at any point, and always sure.
SEND FOR CIRCULAR.

For sale by the Hardware trade.

—MANUFACTURED BY—

LANE BROS.
POUGHKEEPSIE, N. Y.

E. C. STEARNS & CO.,
SYRACUSE, N. Y.



EXCLUSIVE SELLING AGENTS
OF THE VANDERBILT
SASH BALANCE.

PATENT PERFECTION PADLOCK.



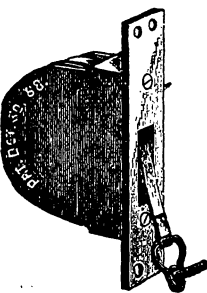
Eight Tumblers, Key Turning Both Ways.

Sizes, $\frac{1}{4}$ inch to $2\frac{1}{4}$ inches, of cast bronze. Defies competition for quality and price. No steel or iron used, cannot rust, and cannot be picked. Also, $\frac{1}{2}$ and $\frac{5}{8}$ inch Padlocks, opened with a common pin, in brass and nickel, for cats and small dogs. The best Railroad Switch and Car Lock in the world.

Adopted by the United States Treasury for bonded warehouses.

AMES SWORD CO., Chicopee, Mass.

Send for Price-Lists and Circulars.



DOES IT PAY?

To buy an inferior article, which your trade condemns, when you can get

THE CALDWELL SASH BALANCE.

The best material, right principle and care in making and testing have made it the **LEADER** for five years. Write to

CALDWELL MFG. CO., Rochester, N. Y.

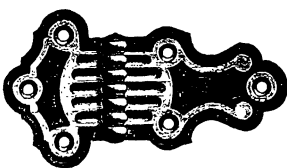
READING HARDWARE COMPANY.

"Vassar" Rim Night Latches and Dead Locks have our Patent Self-Adjusting connecting Spindle, which requires no cutting or filing.

This point will be appreciated by any one who knows about Cylinder Latches.

NEW YORK, PHILA., CHICAGO.

Factories, **READING, PA.**



CORRUGATED WROUGHT BRASS HINGES,

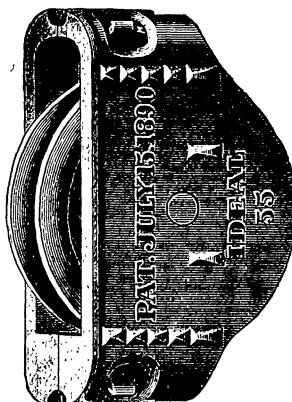
FOR REFRIGERATORS, ETC.

Original and Striking Designs in a Great Variety of Finishes.

SEND FOR PRICE-LIST.

THE STANLEY WORKS, NEW BRITAIN, CONN.,
79 CHAMBERS STREET, N.Y.

Ideal Sash Pulley, No. 55.



Adapted for auger socket or machine made mortise. Applied without chisel or screws, quickly and a perfect fit in every case. The only all round Sash Pulley made. Sample free. Price on application.

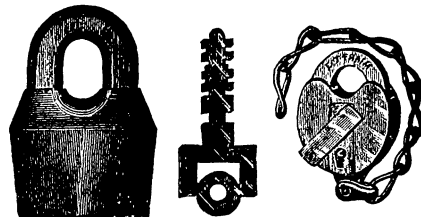
STOVER MFG. CO.,

145 River St., Freeport, Ill.

ESTABLISHED 1879.

KEYSTONE LOCK WORKS,

E. T. FRAIM, Lancaster, Pa., U. S. A.



Originators, designers, patentees and manufacturers of all the leading popular styles of **PADLOCKS**, Key-Locking Scandinavian with our patent Inter-Locking Tumblers; the only reliable lock of this style ever made. **SELF-LOCKING** Scandinavian of the highest type of perfection. Dust Proof Railroad, Freight Car and Switch Padlocks. Brass, Bronze, Steel and Malleable Iron Padlocks for all purposes and in all finishes. 131 different kinds. Write for our new 100-page catalogue.

SURPLESS, DUNN & ALDER, General Agents,
97 Chambers St., NEW YORK.

Notes on the Construction of Cranes and Lifting Machinery. By EDWARD C. R. MARKS. 118 illustrations. 12mo, cloth, \$1.00
For sale by **DAVID WILLIAMS, 96-102 Rensselaer St., N.Y.**

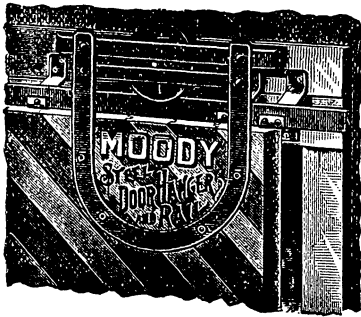
COMMON MOUSE TRAPS BEST FOR USE!

Ripley Mfg. Co., Unionville, Conn



Porcelain-Lined Lemon Squeezers, Steak Hammers, Boot Jacks, Magnetic Tack Hammers, Mallets, Bung-Starts, Hand Screws, Beacon Hill Pat. Mouse Traps, Sunny-Side 2 lb. Lap Board

VICTOR MFG. CO., Newburyport, Mass.

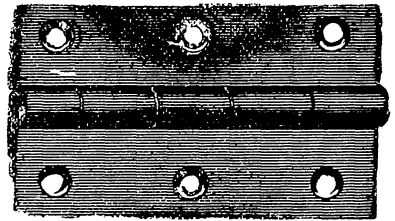
STEEL RAIL.

Showing one-half set of hangers attached to door.



The Only Bracing Bracket Made.

PRICE-LIST.		
HANGERS.		Per Doz. pra
No. 5, to run 6 feet, $3\frac{3}{4}$ in. wheel,	-	\$10.00
No. 6, to run 10 feet, $4\frac{1}{2}$ in. wheel,	-	15.00
No. 7, to run 15 feet, $5\frac{1}{2}$ in. wheel,	-	22.00
RAIL, per foot.....		6 $\frac{1}{4}$ cents.

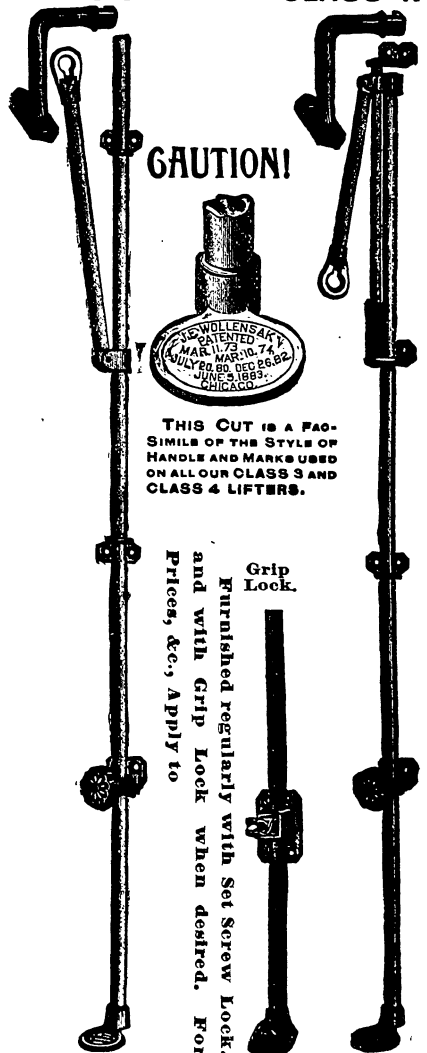
**Cast Brass Butt Hinges**

IN STOCK AND FOR SALE BY

W. & J. TIEBOUT,

Nos. 16 & 18 Chambers Street, New York,

MANUFACTURERS OF

**BRASS, GALVANIZED & SHIP CHANDLERY
HARDWARE.****Transom...Lifters****OLD RELIABLE****J. F. WOLLENSAK'S PATENT.****CLASS 3.****CLASS 4.****CAUTION!**

THIS CUT IS A FAC-SIMILE OF THE STYLE OF HANDLE AND MARKS USED ON ALL OUR CLASS 3 AND CLASS 4 LIFTERS.

Furnished regularly with Set Screw Lock, and with Grip Lock when desired. For Prices, &c., Apply to

Grip Lock.**J. F. WOLLENSAK, - CHICAGO, ILL.****THE WILCOX & HOWE COMPANY,****BIRMINGHAM, CONN.,**

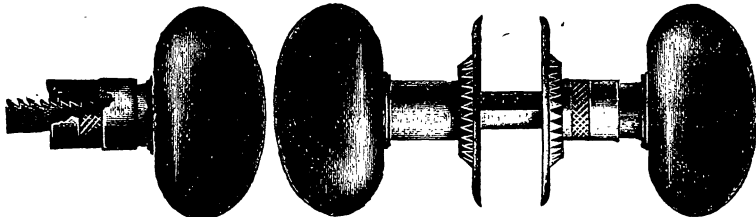
MANUFACTURERS OF

**A Full Line of Carriage Hardware
ALSO SPECIAL FORGINGS.**

Estimates cheerfully given. Send for Catalogue

SASH WEIGHTS**E. E. BROWN & CO.,****McKean and Meadow Sts.,
PHILADELPHIA, PA.**

Sectional cut showing construction of knob.



Half size cut of knob as applied to door. No side screws or adjusters.

Don't you want your stock to represent the latest and most improved up to date Hardware? The Whipple Patent Door Knob is the latest and best Door Knob attachment ever made. Give it a trial.
PERRY & WHIPPLE CO., New Haven, Conn.
New York Sales Agent, E. G. SHEPARD, 142 Chambers Street.**RICHARD ECCLES,****AUBURN, N. Y.,**

MANUFACTURER OF

Finest Carriage Forgings, Couplings, Clips, King Bolts, Fifth Wheels, &c. Manufacture a full line Special Drop Forgings.

Medal Awarded at World's Fair, Chicago.

Send for New Catalogue for Season 1893-94

WHY USE WOODEN OR HEAVY STEEL BLOCKS

WHEN THE STEEL AND IRON

TACKLE BLOCKS

—MADE BY—

The Cleveland Block Co.,**CLEVELAND, OHIO, U. S. A.,****ARE BETTER IN EVERY WAY.**

No waste material. Every ounce of weight in the line of strength. No clumsy outside straps or bolts. As light as wooden blocks and vastly more durable. They wear, but never break. Sheaves interchangeable

General Agents: Topping Brothers, 92 Chambers Street, New York.
New England Agents, - Dodge, Haley & Co., 212 High Street, Boston**SASH WEIGHTS!****NORTON BROTHERS,**

Manufacturers,

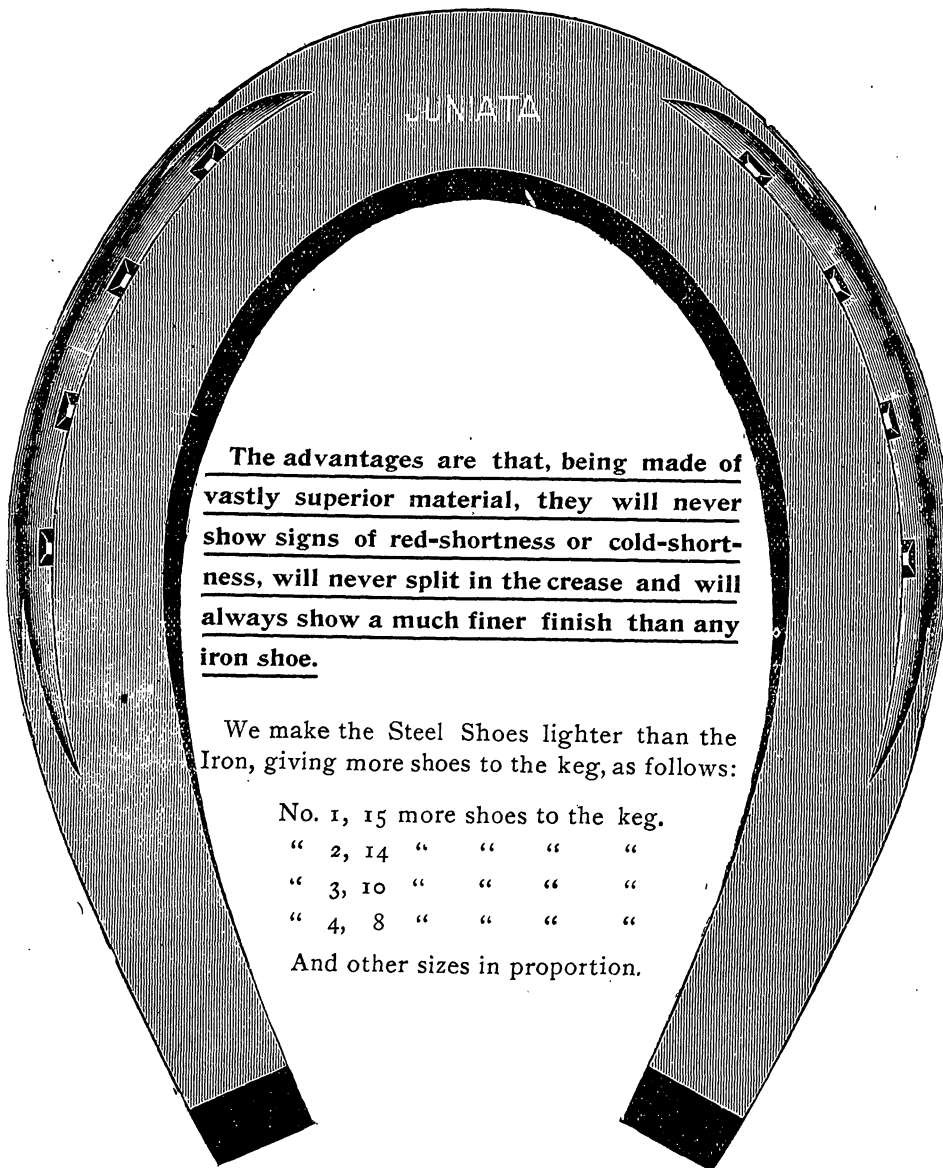
Office: 813 Masonic Temple, CHICAGO.

WORKS AT MAYWOOD, ILL.

STEEL HORSE SHOES.

SHOENBERGER & CO., PITTSBURGH, PA.,

After numerous and costly experiments have succeeded in manufacturing a special quality of soft homogeneous steel, specially adapted to the manufacture of Horse and Mule Shoes, and are now making from this steel Extra Swaged, and Government Pattern Horse and Mule Shoes. They give the best of satisfaction everywhere and we furnish them to the trade at the same prices as the regular iron shoe sold by ourselves and our competitors. We are at present making our Roadster Pattern Horse Shoes out of Iron, but we will make them of Steel also within a short time.



The advantages are that, being made of vastly superior material, they will never show signs of red-shortness or cold-shortness, will never split in the crease and will always show a much finer finish than any iron shoe.

We make the Steel Shoes lighter than the Iron, giving more shoes to the keg, as follows:

No. 1, 15 more shoes to the keg.

" 2, 14 " " " "

" 3, 10 " " " "

" 4, 8 " " " "

And other sizes in proportion.

No. 2 EXTRA SWAGED FRONT.

We also beg to say that we have introduced improved machinery into our new factory and have doubled our capacity, and are now prepared to furnish the best shoe, either iron or steel, ever offered to the trade.

We would also call your attention to our Improved Steel Toe Calk, equal to any in the market. To secure the best wearing qualities use sand or borax in welding on a calk and cool off at a dark red, or still better, cool off without plunging in water. We make sizes numbers 1, 2, 3, 4, 5 and 6, packed in 25-pound boxes.

Write to us for information and prices, or apply to jobbers and dealers, who sell them everywhere.

SHOENBERGER & CO.,

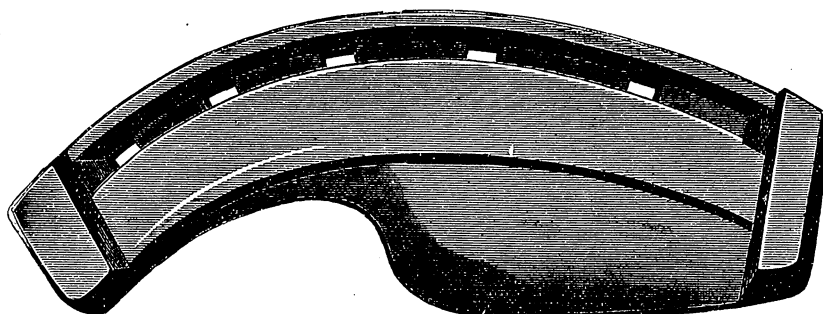
JUNIATA IRON AND STEEL WORKS, - - - PITTSBURGH, PA.

SCRANTON FORGING CO.,

SCRANTON, PA

CARRIAGE HARDWARE AND SPECIAL DROP FORGINGS.

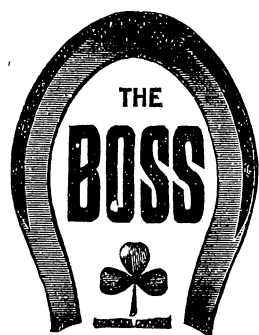
FORGED
OX
SHOES.



Made under Deeble's Patent, Aug. 9, 1887.

Our 1891 pattern is a modification of the style we have made for the past four years, giving additional strength to the web.

IT IS JUST RIGHT.



HORSE AND MULE SHOES.

Superior Quality, Shape and Finish.

BRYDEN HORSE SHOE CO.,

CATASAUQUA, PA.

RHODE ISLAND PERKINS HORSE SHOE CO.,
MANUFACTURERS OF

Horse and Mule Shoes of the Perkins Pattern.

SPECIALTIES:—X L Steel Shoes, Toe Weight Shoes and Goodenough Shoes.

Works at Valley Falls, R. I.

Office, 31 Exchange Place, Providence, R. I.

F. W. CARPENTER, Pres.,

C. H. PERKINS, Gen. Manager,

R. W. COMSTOCK, Sec'y,

CHARLES R. STARK, Treas.

J. C. McCARTY & CO., Agents - 97 Chambers Street, New York.

THE NEW DIAMOND STATE HORSE AND MULE SHOES.

JUST TRY THEM and YOU will say they excel all others.

MANUFACTURED BY

DIAMOND STATE IRON CO.

WILMINGTON, DELAWARE.

Other "high grade" specialties in Rivets, Spikes, Splice Bars, Track and Machine Bolts, Blau Nuts, Stay Bolt Iron, Horse Shoe Iron, Bar Iron, &c.

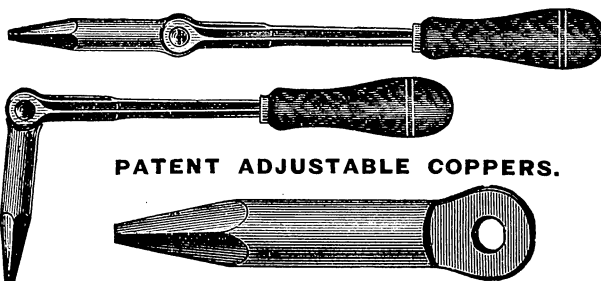
PHILADELPHIA OFFICE,
206 So. Fourth St.

{ Correspondence invited }

NEW YORK OFFICE,
11 Pine St.

Covert Pat. Adjustable Soldering Irons AND Coppers

It is a complete tool in every respect and can be as easily adjusted at angle while hot as cold. The handle can be used indefinitely, as when the copper is worn out it can be replaced in the same handle, making the iron as good as new at about half the cost of the ordinary soldering iron.



PATENT ADJUSTABLE COPPERS.

A sample of $\frac{3}{4}$ in. soldering iron will be sent by mail, free of postage to any address, on receipt of sixty cents (60c.).

FOR SALE BY ALL GENERAL HARDWARE AND PLUMBERS' SUPPLY HOUSES.

COVERT MFG. CO., - West Troy, N. Y.

BURDEN'S

HORSE SHOES.

"Burden Best"

Iron

Boiler Rivets.

The Burden Iron Co.

TROY, N. Y.

PHOENIX HORSE SHOES.

PHOENIX HORSE SHOE CO.,

Poughkeepsie, N. Y.

NEW YORK OFFICE, No. 66 Reade St.

Standard Horse Shoe Co.,
Manufacturers of
HORSE AND MULE SHOES.

LEEDS, ROBINSON & CO., General Agents,

4 Liberty Square, Boston, Mass.



“The Best Driving Nail.”

HIGHEST AWARD
—AT—
World's Columbian Exposition.

In the tests submitted before the judges on awards the Capewell No. 6 was shown to be 17 per cent. tougher than No. 8 of other makes.

“The Best Nail to Hold.”

CAPEWELL HORSE NAILS,
—MADE BY—
THE CAPEWELL HORSE NAIL CO., - - - HARTFORD, CONN.

Office of D. G. BURNHAM,
Director of Works, World's Columbian Exposition,
JACKSON PARK. CHICAGO, ILL.

October 28, 1893.

To THE CAPEWELL HORSE NAIL Co.:
Gentlemen—I have used your horse nails here on the horses belonging to the World's Columbian Exposition, and I think they are far superior to any others that I have ever used. As I have been in the horseshoeing business for about twenty-five years, I know what I am talking about.

Very respectfully,
HERMAN J. HENKE,
Foreman Blacksmith, World's Columbian Exposition.

The Capewell Patent Corrugated Horse Nail.

Needs No Clinching.

Highest Award

FOR

Supreme Excellence

TO

The **PUTNAM** Hot-Forged and
Hammer-Pointed Horse **NAILS,**



At the *World's Columbian Exposition* at Chicago. A medal and diploma worded:
“Supreme excellence in material, method in manufacture, and quality of finished product; elasticity and smoothness combined with holding power in clinch.
It allows the use of very small nails.”

There is nothing beyond “supreme excellence,” nor is there anything comprised in a horse nail, except the “material from which it is made,” “the method of manufacture,” and “quality of finished product.” Putnam nails, by their “elasticity,” give slightly to the expansion and contraction of the hoof while the horse is in motion; by their “smoothness,” do not enlarge the nail holes in the hoof, while their “supreme excellence,” in “holding power in the clinch,” enables them to hold the shoe in the hardest service until worn out.

By the “use of small nails,” large holes are avoided and money saved to the smith.

Thus it will be seen that the officials of the *World's Columbian Exposition* recognize what qualities go to make up a good horse nail and that only the “Putnam” contains them all.

PUTNAM NAIL CO.,
Neponset, Boston, Mass.

H. D. SMITH & CO.,

Plantsville, Conn.,

MANUFACTURERS OF THE BEST QUALITY

CARRIAGE MAKERS' HARDWARE,

MANUFACTURE THE LARGEST VARIETY OF

FORGED CARRIAGE IRONS

Of Best Material and Workmanship.

Send for Price and Illustrated List of

CHAMPLAIN

Manufactured by the **NATIONAL HORSE NAIL CO.,**
VERGENNES, VERMONT.

All Sizes. All Patterns. All Warranted. Sold Everywhere.

J. C. McCARTY & CO., Agents, New York.



Elegant Iron.

Beautiful Shape.

HORSE SHOES,

Light, Medium and Heavy.

MULE SHOES,

Light, Medium and Heavy.

Illustrated booklet and prices to all parts of the world on application.

OLD DOMINION IRON AND NAIL WORKS CO.,

ARTHUR B. CLARKE, President.

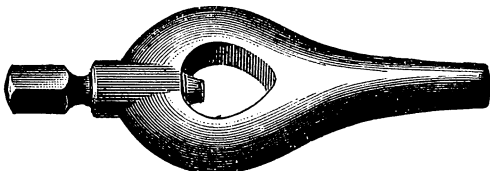
Chicago Office, 45 La Salle St.

Richmond, Va., U. S. A.

LE COUNT'S STRAIGHT TAIL DOG,

WITH STEEL SCREWS.

U. S. Standard, and the points hardened. To be driven from a stud in the face plate. It is from the same pattern as the Heavy Steel Dog, and warranted, like that, not to break with any work.



No.	Inch.	Price.	No.	Inch.	Price.
1.....	3/4	\$0 80	11.....	3 1/2	\$1 45
2.....	1	70	12.....	3	1 60
3.....	1 1/4	70	13.....	3 1/2	1 80
4.....	1 1/2	80	14.....	4	2 10
5.....	1 3/4	80	15.....	4 1/2	2 75
6.....	1 3/4	95	16.....	5	3 25
7.....	1 3/4	95	17.....	5 1/2	4 00
8.....	1 3/4	1 10	18.....	6	5 00
9.....	2	1 20	19.....	7	6 00
10.....	2 1/4	1 35	20.....	8	7 00

One set to 2 inch, \$7.80. Full set, \$44.10

This pattern will stand much more than a bent tail, and some prefer them on account of their direct action on the work.

SEND FOR CATALOGUE OF FULL LINE OF MACHINISTS' TOOLS.

C. W. LE COUNT, MANUFACTURER, SO. NORWALK, CONN., U. S. A.
These goods are for sale by CHAS. CHURCHILL & CO., Ltd., 21 Cross St., London, England.

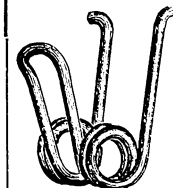
P. F. BURKE, C. F. DEWICK & CO.
Manufacturers of
PATENT STEEL
(Blunt and Sharp)
TOE-CALKS.
—ALSO—
BURKE'S IMPROVED
HORSESHOERS' FOOT VICE.
Send for Circulars.
360 Dorchester Av. Dis for Welding
BOSTON, MASS. Sharp Calks.

Crescent

Horse and Mule Shoes,
BAR IRON.

CRESCENT HORSE SHOE AND
IRON CO.

Max Meadows, Va.



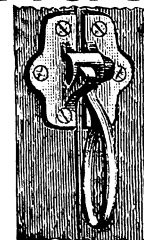
FROST'S ANTI-RATTLER

Pat. Jan. 20, 1880.

Cut One-half Size.
Sample pair sent to any hardware or saddlery firm by addressing

The Frost Thill Spring Co.,
Boston, Mass.

P. J. Conroy & Co.,
Paschall, PHILADELPHIA.



"CONROY"
Refrigerator Door
Fasteners

Have rapidly supplanted all others.

Refrigerator Trimmings.

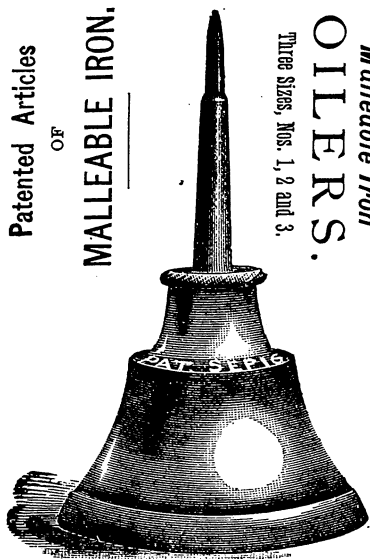
Pat. Dec. 15 '85

BUFFALO SCALE CO., Buffalo, N. Y. SCALES OF ALL KINDS.

Patented Articles

OF

MALLEABLE IRON.



New Improved
PATENT
Malleable Iron
OILERS.
Three Sizes, Nos. 1, 2 and 3.

Hammer's

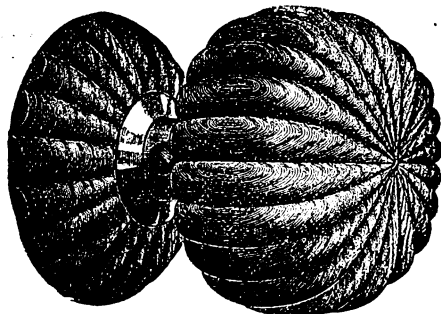
Adjustable Clamps.
Mall. Iron Hand Lamps.
M. I. Hanging Lamps

New Pattern Heavy Screw Clamps.
Strongest in the market.

For Sale by all the Principal Hardware Dealers.
SEND FOR PRICE LIST.

MALLEABLE IRON CASTINGS
of superior quality, and Hardware Specialties
in Malleable Iron, made to order.

HAMMER & CO., Branford, Conn.



WOOD DOOR KNOBS,
DOOR SPRINGS AND CHECKS
AND CHECKING SPRING HINGES.
NEW GOODS. NEW PRICES.
Send for New Price-List.

J. BARDSLEY, 149 & 151 Baxter St New York.

HARDWARE DEALERS

CAN RECOMMEND THE

**CHAMPION METAL WINDOW
SASH CHAINS**

to their customers as a reliable substitute for
Sash Cords, very strong and lasting (some in
daily use ten years), and gives thorough satis-
faction wherever used. The patented attach-
ments are very simple and can be applied to
any window.

MANUFACTURED ONLY BY

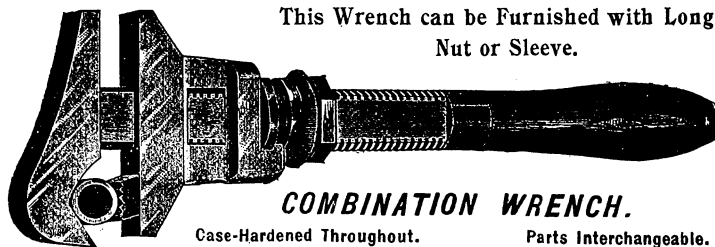
"THOMAS MORTON,"

65 Elizabeth Street,

Write for Prices.

NEW YORK.

The Practical Polish and Varnish Maker.
By H. C. STANDAGE. A treatise containing 750 re-
ceipts and formulae for the manufacture of var-
nishes, polishes, &c. 12mo, cloth.....\$2.50
For Sale by DAVID WILLIAMS, 96-102 Reade St., N.Y.



This Wrench can be Furnished with Long
Nut or Sleeve.

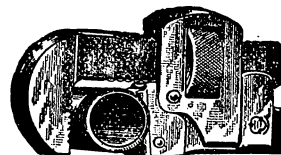
COMBINATION WRENCH.

Case-Hardened Throughout.

Parts Interchangeable.

This wrench not only combines the superior qualities of a Gas Pipe Wrench but also all the
requisite combinations of a regular Nut Wrench, thus making a combination which has no equal.
For Circulars and Price-List, address

BEMIS & CALL HARDWARE & TOOL CO., Springfield, Mass., U. S. A.



TRIMO PIPE WRENCH,

Forged Steel

All parts interchangeable.

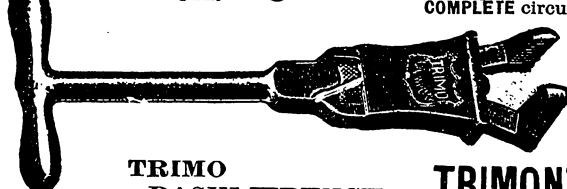
Grips firmly without loss of motion. Releases readily. Never locks. Causes no
trouble in close quarters. Does not crush the pipe.

TRIMO

CHAIN

PIPE

WRENCH.



**TRIMO
BASIN WRENCH.**

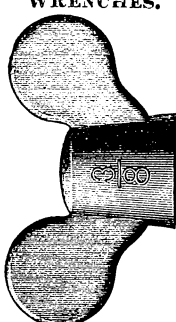
Superior in strength and ease of operation.
COMPLETE circular grip. Never slips nor crushes.

Can be used with one
hand and in closer quarters
than any other Basin
Wrench. Parts Interchange-
able.

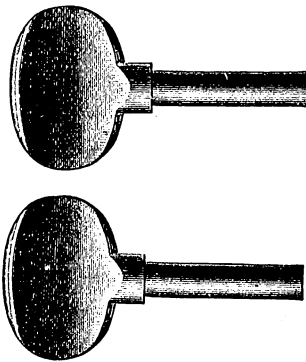
**TRIMONT MFG. CO., ROXBURY
MASS.**

J. H. Williams & Co.,
9 to 15 Richards St., BROOKLYN.

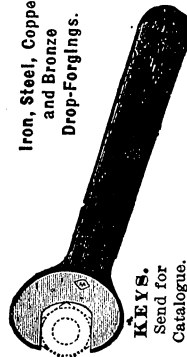
**TRACK
WRENCHES.**



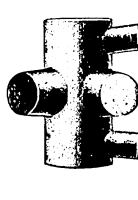
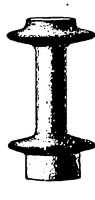
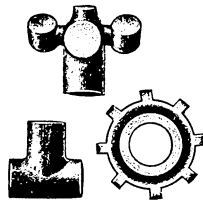
**SHAFTING
COLLARS.**



Iron, Steel, Copper
and Bronze
Drop-Forgings.

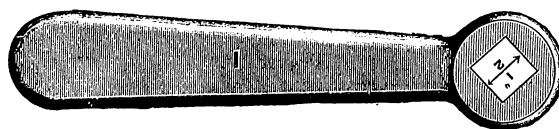


KEYS.
Send for
Catalogue.



WYMAN & GORDON
WORCESTER, MASS.
DROP FORGINGS

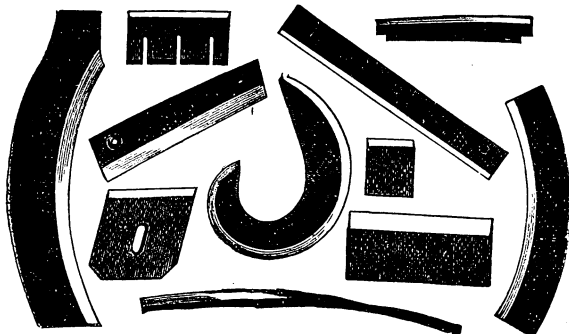
Box Tool Post Wrenches



Drop Forged from Bar Steel. Finished and Case Hardened.

THE BILLINGS & SPENCER CO., Hartford, Conn.

Drop Forgings of Every Description.



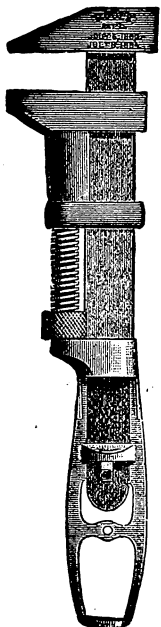
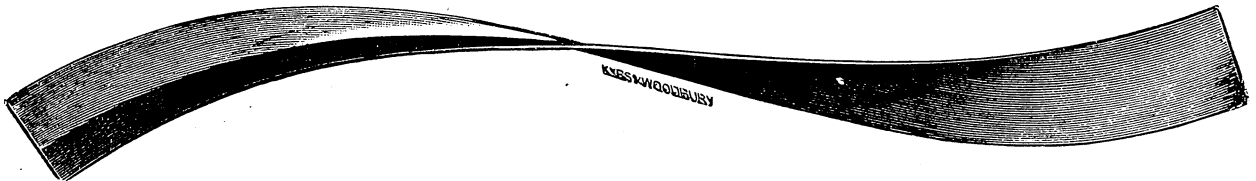
LORING COES & CO.

WORCESTER, MASS.

Manufacturers of **MACHINE KNIVES.**

Shear Blades and Strips, Moulding Cutter Plate, Die Stock for Leather, Cloth and Paper Cutting Dies. Lawn Mower and Hay Cutter Knives of every description.

End view of Plated Stock for Dies, Lawn Mower Knives, Blades Etc., showing how the Steel is laid.

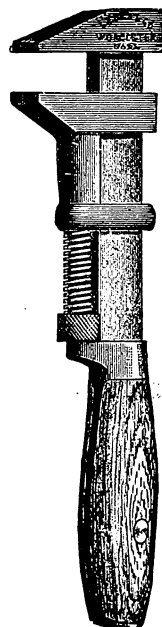


L. COES'

Genuine Improved
**KNIFE HANDLE
PATENT**

Screw Wrenches

MANUFACTURED BY
COES WRENCH CO.,
WORCESTER, MASS.



Established in
1839.
Registered
March 31, 1874.

Patented July
8, 1880.
Patented July
8, 1884.

Sectional View Illustrates our New Knife Handle, showing Malleable Iron Frame and Shank of Bar keyed into position.

— Straight Bar, Extra Long Nut for Screw in Jaw. —

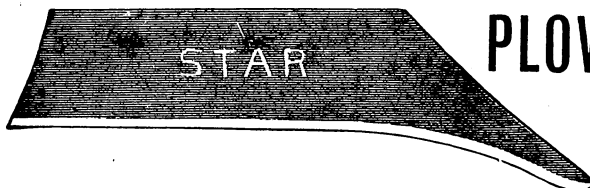
The **BEST MADE** and **STRONGEST WRENCH** in the MARKET.

J. C. McCARTY & CO.,
JOHN H. GRAHAM & CO., } New York Agents.

STAR MANUFACTURING CO..

Carpentersville, Kane Co., Ill.

MANUFACTURERS OF



PLOW SHARES.

Plow Moldboards,
Landside Plates,
Landside Points.

Lister Shares, Fin Cutters, Cultivator Shovels, Cultivator Shovel Points, Plow Points, Screw Coulter Hubs.

Mention IRON AGE.



ELEMENTS OF COST.

By Frederick W. Child.

20 PAGES,

Paper, 25 Cents.

5 x 7 1/4 inches.

An address to the Institute of Accounts, New York, of which the writer is a member, put in form to assist those in charge of manufacturing accounts. Practical forms are included for a series of order books, examples of foreman's order, form of pay-roll, quarter-time book, job time book, form of summary, charges book, summary of costs, material, labor, cash, expense, manufacturing and improvement acts, store-room, iron foundry, brass foundry. Sent post-paid on receipt of price, by

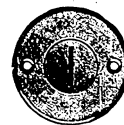
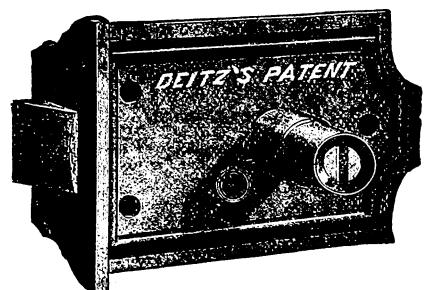
DAVID WILLIAMS, Publisher and Bookseller, 96-102 Reade Street, New York.

• **IMPROVED MINE LAMP** •
FOR ANTHRACITE AND
BITUMINOUS
MINING
6
DIFFERENT
STYLES
OF SPOUTS.
SAMPLE 15¢.

SEAMLESS
BRASS
COLLAR
BRASS HINGE
Lid solid
No SOLDERING

B. E. LEONARD, Scranton, Pa.

A. E. DEITZ



No. 109 Latch.

J. C. McCARTY & CO., Agents,
97 Chambers and 81 Reade Sts., New York.

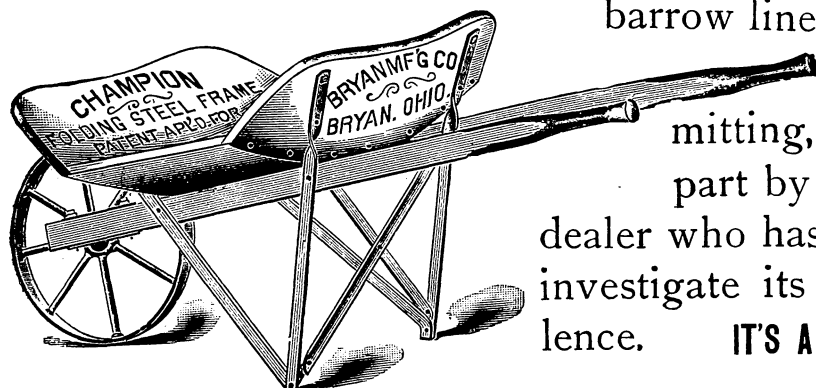
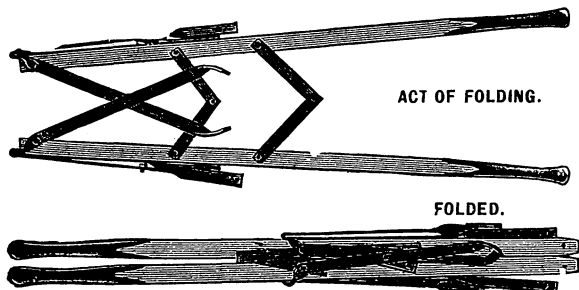
Factory, BROOKLYN, E. D., N. Y.



BARROWS.

Wood, Iron, Steel,
for Ore, Coal, Fur-
naces, Brickyards,
Stoneyards, Farm
and Garden Use.

The
Kilbourne & Jacobs Mfg. Co.,
COLUMBUS, O., U. S. A.



The Champion

Has excited the interest of the trade beyond anything ever offered in the barrow line. The reasons for this are many, and space not permitting, we shall be glad to impart by mail or otherwise to any dealer who has not yet taken the time to investigate its many features of excellence. **IT'S A SELLER AND NO MISTAKE.**

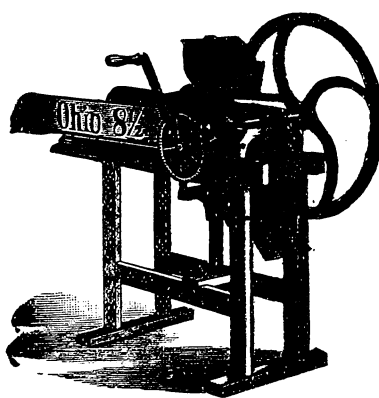


**THE BEST
OX-BOW
PIN**

In the World.

Sample sent
and prices given
on application.

Manufactured by
**O. C.
SAWYER,**
Sharon, Vermont.



THE "OHIO" Feed and Ensilage Cutters and Carriers are the best. By reason of wide open throat (being full width of cutting surface, all sizes), and improved feeding device, our machines have greater capacity than others.

THE SILVER MFG. CO., Salem, O.
LINDSAY BROS., - MILWAUKEE, } General
MANLEY & THOMPSON, ST. LOUIS, } Agents.

PHILLIPS SCREENS

Are Reliable.

BOLTS,

Machine, Car,
Track, Pipe, Loom.

Cold Punched

NUTS.

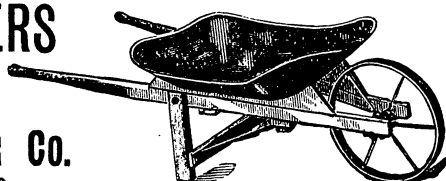
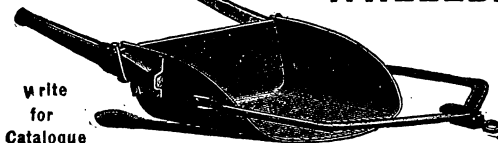
AMERICAN BOLT COMPANY, - - Lowell, Mass.

ALL STEEL WHEELBARROWS & SCRAPERS

MANUFACTURED BY

AMERICAN STEEL SCRAPER CO.

104 Court Street, SIDNEY, O.

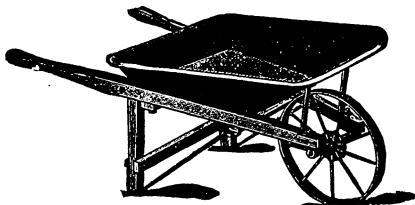


Write
for
Catalogue

BELOW COST!

When selling goods below cost makes no profit, first-class goods don't have to be sold that way; they always command good prices.

We are, however, making better prices than formerly, and if you care to ascertain what we can do for you, write us.



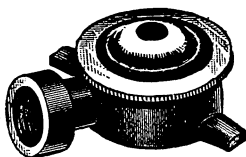
Sidney Steel Scraper Co., 924 Poplar Street, SIDNEY, OHIO.



Japanese No. 12, Adjust.

LAWN SPRINKLERS.

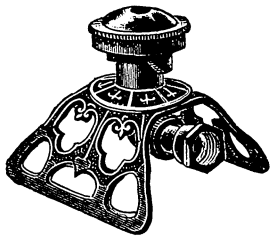
Cactus No. 9.



We manufacture the BEST and CHEAPEST Lawn Sprinklers in the World.

The only Sprinklers which have no revolving parts to leak or wear out. The only Sprinklers free from small holes, and which cannot become clogged with gritty substances. The only Sprinklers which are adjustable and will give a spray as fine as the mist of Niagara, or as heavy as the area of the supply pipe.

The best Sprinklers for high pressures, and the only sprinklers which will give satisfaction with low pressures. We also manufacture the old style revolving sprinklers, but for our own use would not have them.

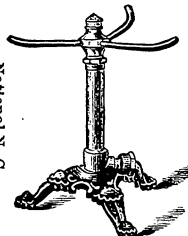


Cactus No. 5.

Ette & Henger Mfg. Co.

ST. LOUIS, MO.

National N. G.



SEND FOR DESCRIPTIVE CIRCULARS.

LITTLE GIANT

Traveling Lawn Sprinkler.

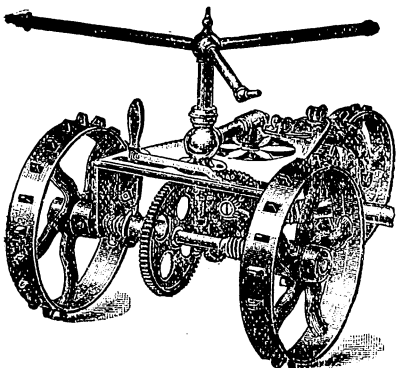
PATENTED.

Can be set to travel anywhere from 15 to 500 feet per hour, either on a straight line or in a circle, and can be gauged to throw water over a swath 5 to 50 feet in width.

Highest Award at World's Columbian Exhibition.

SEND FOR CIRCULAR.

PORTLAND LAWN SPRINKLER CO.,
PORTLAND, ME.

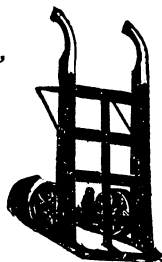
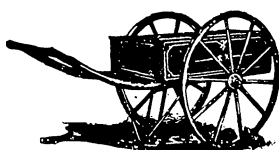
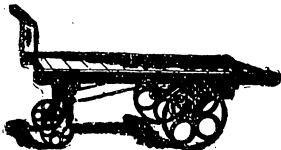


LANSING WHEELBARROW CO., Lansing, Mich.,

MANUFACTURERS OF

EVERYTHING in the way of Steel and Wood Barrows, Warehouse Trucks and Hand Carts.

SEND FOR CATALOGUE.



If You will but INSIST of your Jobber

Upon having the "HUSTLER" for the Lawn, and the "BOSS" for the Garden, you can rest assured that you are getting not only the BEST, but the CHEAPEST in that line.

We make other styles of Rakes, but none so good as the above—They are the best.

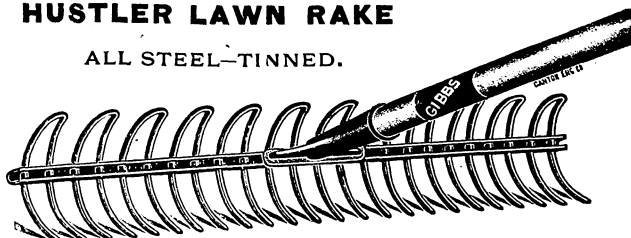
Sold by Leading Jobbers Everywhere.

Our line of POST HOLE DIGGERS comprise 5 of the BEST KNOWN STYLES on the market. Prices low.

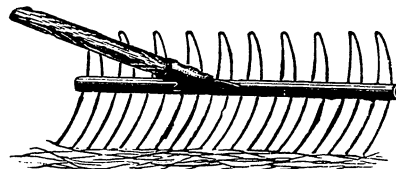
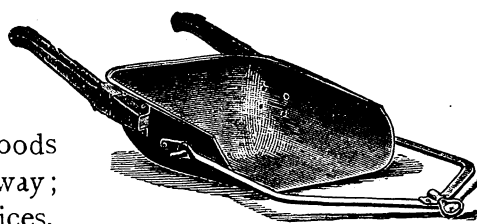
Gibbs Mfg. Co., Canton, Ohio.

HUSTLER LAWN RAKE

ALL STEEL-TINNED.



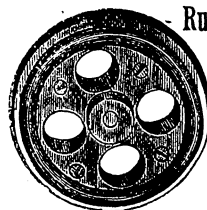
Lawn Rakes, Garden Rakes,
Curry Combs,
Pruning Shears, Post Hole Diggers.



Lead and Others Follow.

We manufacture the ORIGINALS; others follow! But to lead in prices and quality is the success of our Post-hole Diggers, Reversible Lawn-rakes, Spring Curry-combs, Saw-sets, etc.

F. E. KOHLER & CO.,
CANTON, OHIO.



Rubber and Iron Wheels

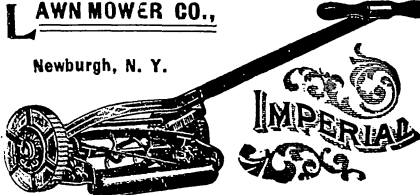
Casters for Trucks, Baskets and Boxes
Heavy Casters for Mill use.

Catalogues free.
G. P. CLARK, Box 0,
Windsor Locks, Conn.

COLDWELL

LAWN MOWER CO.,

Newburgh, N. Y.



THE BEST MOWER MADE.

The Lightest Running Mower in the World.

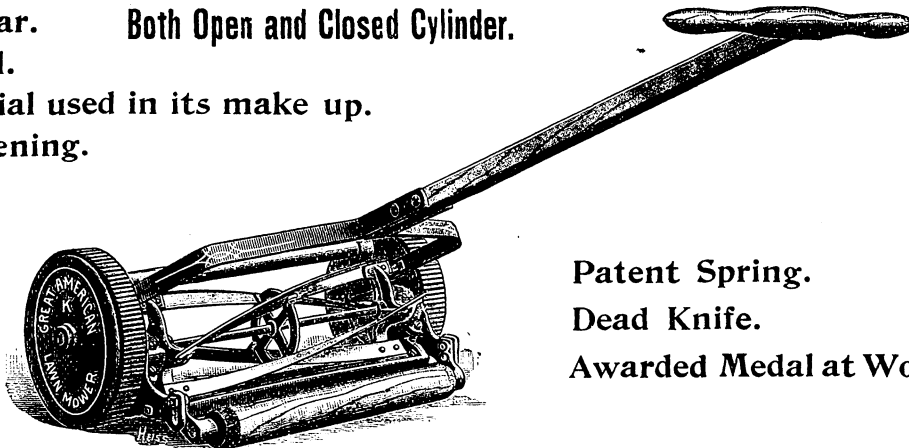
This is the only Lawn Mower that stood the test of working the entire season on the Columbian Exposition Grounds without any repairs.

PHILLIPS SCREENS

Are Reliable.

THE GREAT AMERICAN LAWN MOWER.

Incased Gear. Both Open and Closed Cylinder.
 Silent Pawl.
 Best material used in its make up.
 Self Sharpening.



(SHOWING OPEN CYLINDER.)

Also manufacturers of Pennsylvania, Continental, New Quaker City, Rapid Transit, New Departure Mowers. Horse and Pony Mowers, Grass Catchers.

Patent Spring.
 Dead Knife.
 Awarded Medal at World's Fair.

SUPPLEE HARDWARE CO., - - - **PHILADELPHIA.**

McGuire's ♦ Diamond.

MANUFACTURED BY

Dille & McGuire Mfg. Co.,
RICHMOND, IND., U. S. A.

PRICE-LIST.

Wheels, 8 Inches High. Cutter, 5½ Inches Diameter.

LENGTH.	LIST.
10 Inch	\$13.00
12 " - - - -	14.00
14 " - - - -	15.00
16 " - - - -	16.00
18 " - - - -	17.00

Discount to the
 Trade,
 70 per cent.,
 F.O.B. Factory.

PHOSPHOR BRONZE JOURNAL BEARINGS. BEST QUALITY STEEL.

This is the Mower contracted for by the Chief of Construction at the Columbian Exposition; was used on the lawns at the World's Fair grounds during the preparatory season of 1892, and being approved by the Landscape Architects, was adopted exclusively for 1893.

If you wish a first-class Mower in all respects, one that is fully warranted,

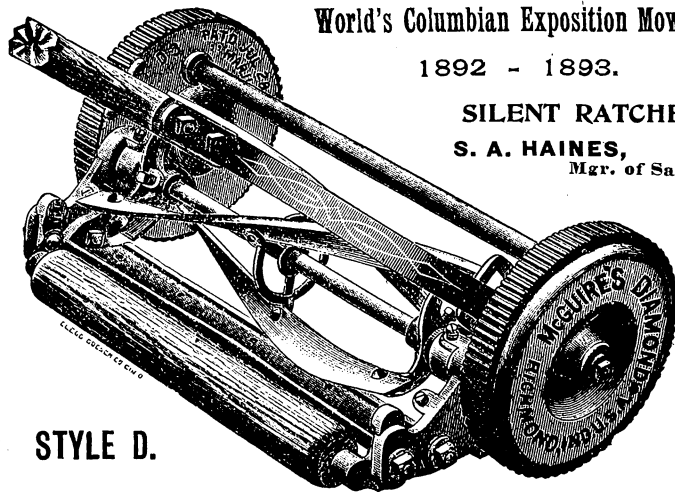
—BUY MCGUIRE'S DIAMOND.—

—OFFICIAL—
 World's Columbian Exposition Mower.

1892 - 1893.

SILENT RATCHET.

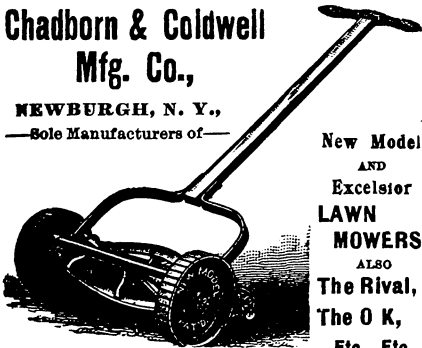
S. A. HAINES,
 Mgr. of Sales.



STYLE D.

**Chadborn & Coldwell
Mfg. Co.,**

NEWBURGH, N. Y.,
 —Sole Manufacturers of—



New Model
 AND
 Excelsior
**LAWN
 MOWERS**
 ALSO
 The Rival,
 The O K,
 Etc., Etc.

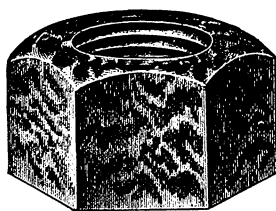
Send for Illustrated Catalogue.

DUNHAM NUT CO.,

UNIONVILLE, CONN.,

Manufacturers of

All Grades
 of
 Finished
 Nuts
 and



Automatic Cold Press Nut Machines.

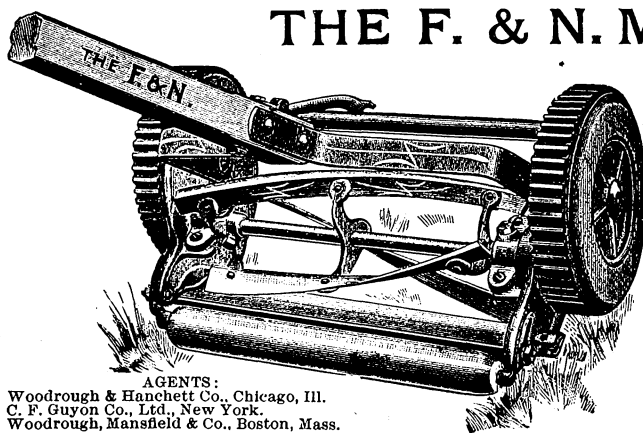
SEND FOR CATALOGUE.

Why Band Saws Break. Sixteen reasons and how to avoid them. Being instructions to filers on the care of large band-saw blades used in the manufacture of lumber. By JOSHUA OLDHAM. 90 pages, illustrated, cloth.....\$1.00
 For Sale by David Williams, 96-102 Reade St., N.Y.

THE F. & N. MFG. CO.,

Manufacturers of
Lawn Mowers
 and
Grass Catchers,
 RICHMOND, IND., U. S. A.

**THE
 F. & N.
 LAWN
 MOWER
 " '94."**



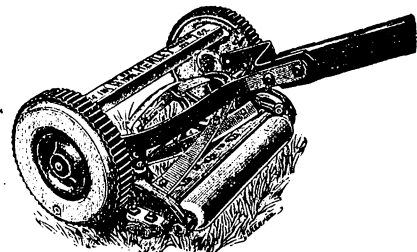
AGENTS:
 Woodrugh & Hanchett Co., Chicago, Ill.
 C. F. Guyon Co., Ltd., New York.
 Woodrugh, Mansfield & Co., Boston, Mass.

Solid Steel Cutter Bar. Reel
 Knives adjusted to Cutter
 Bar. Phosphor Bronze Reel
 Bearings.

HENLEY'S MOWERS

For Lawns and Parks

Are first class, high grade machines, made of the best materials, neat, symmetrical, strong and unexcelled in construction and ease of operation. Does perfect work. For prices, address



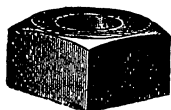
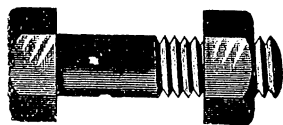
M. C. HENLEY, Sole Mfr., Richmond, Ind., U. S. A.

EASTERN REPRESENTATIVES: H. S. Earle, 110 and 112 N. Warren St., Syracuse, N. Y.; Wm. H. Cole & Sons, 13 S. Charles St., Baltimore, Md.; Carpenter & Bayles, 91 Chambers St., New York City.



WROUGHT WASHERS

Every Washer
FLAT
With hole in
TRUE CENTER.



Packed in kegs for general trade, or in 1 and 5 lb. boxes for hardware trade.

MACHINE BOLTS.

HOT PRESSED NUTS.

Highest
Standard of
EXCELLENCE.

It will pay you to correspond with us.

THE MILTON MNFG. CO.,

MILTON, PA.

Pennsylvania Bolt & Nut Co.

Lebanon Pa.

MANUFACTURERS OF

REFINED BAR-IRON · MACHINE · BOLTS · TRACK · BOLTS · & · BOLT · ENDS ·
LAG · SCREWS · GIMLET · POINTED · COACH · SCREWS · HOT PRESSED & COLD PUNCHED SQUARE & HEXAGON NUTS ·
CHAMFERED & TRIMMED NUTS · WROUGHT & CAST WASHERS · TURN · BUCKLES ·
STRUCTURAL & ELECTRICAL FORGINGS · BOILER & BRIDGE RIVETS · CAR FORGINGS & ARCH · BARS ·

Genuine Philadelphia Lawn Mowers.

Highest Award at the Field trial, World's Fair, Chicago, 1893.

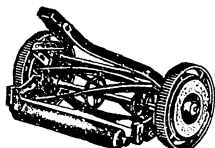
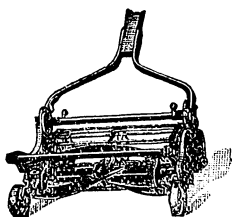
375,000 Machines Sold.

Hand, Pony and Horse Machines, Traveling Lawn
Sprinkler, Lawn Sweeper and Collectors.

ACKNOWLEDGED STANDARD OF EXCELLENCE FOR 22 YEARS.

SEND FOR PRICE-LIST AND DISCOUNTS.

THE PHILADELPHIA LAWN MOWER CO., { Successors to Graham, Passmore & Co., } 3107 & 3109 Chestnut St., Philadelphia, Pa.

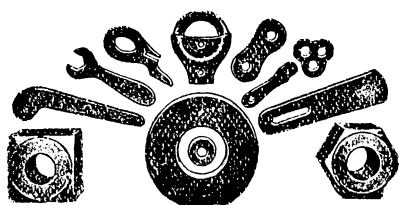
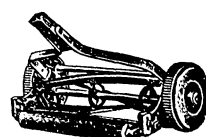
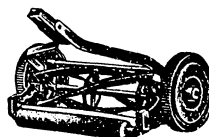


A new catalogue of the best line of

LAWN MOWERS

in the market is yours for the asking.

BLAIR MFG. CO.,
SPRINGFIELD, MASS.



J. FRED WILSON, Worcester, Mass.

Metal Punching AND Die Work.

Cold Punched Nuts and Washers
for all Purposes.

SEND FOR PRICES ON

SPECIALTIES IN LINE OF PRESS WORK.

K

EXPANSION BOLTS.



Manufacturers of Single and Double,
For fastening all kinds of Structure to Brick and Stone
Work. Catalogue furnished on application.
STEWART & ROMAINE MFG. CO., - Philadelphia.

WM. H. HASKELL, PRESIDENT.

E. S. MASON, TREASURER.

D. A. HUNT, AGENT.

WM. H. HASKELL CO.,

—MANUFACTURERS OF—

GIMLET POINT COACH SCREWS

Bolts, Cold-Punched Nuts and Washers,
SUITABLE FOR MACHINERY OF ALL KINDS.

Office and Works: 451 Main St., PAWTUCKET, R. I., U. S. A.

HENRY B. NEWHALL CO., Agents,

105 CHAMBERS STREET, NEW YORK. - 47 PEARL STREET, BOSTON.

WORCESTER MACHINE SCREW CO., Worcester, Mass.

MANUFACTURERS OF

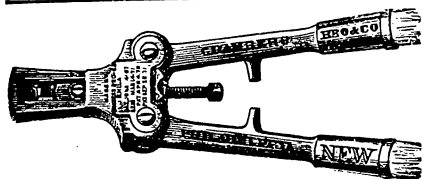
SET, CAP AND MACHINE SCREWS.

STUDS FOR STEAM ENGINES, PUMPS, &c.

EXPANSION BOLTS.



For Fastening all Kinds of Structure to Brick and Stone Work.
Patentee and Mfr., **ISAAC CHURCH.**
Send for Catalogue. Toledo, O.



BOLT & RIVET CLIPPERS,
For cutting off the ends of Bolts and Rivets.
Liberal discounts to the trade.

CHAMBERS BROTHERS COMPANY
52d St., BELOW LANCASTER AVE.,
PHILADELPHIA, PA.

WM. H. JACOBUS,

No. 90 Chambers St., New York.

New York Office of

J. F. Wollensak.
Barnes Mfg. Co.
N. R. Streeter & Co.
Geo. W. Nock.
Tuck Mfg. Co.

Henis Vegetable Press.
Dille & McGuire Mfg. Co.
Bommer Bros.
Palmer Hdw. Mfg. Co.
Wire Goods Co.

National Rivet Works.
Wolcott Hdw. Co.
Fibre Head Mallet.
Burnside Cedar Faucets.
Cleveland Window Shade Co.

Zimmerman's Blind Adjusters.
Garritt & Beach
Wilcox Mfg. Co.
M. B. Schenck & Co.
Hemacite Mfg. Co.

Franklin Mfg. Co.
Atlas Mfg. Co.
National Specialty Mfg. Co., Ltd.

RIVETS
OF EVERY DESCRIPTION, FIRST QUALITY.

W. P. TOWNSEND & CO.
NEW BRIGHTON, PA.

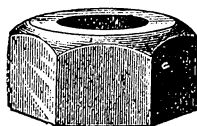
ROUND HEAD. FLAT HEAD. STEEPLE HEAD. COUNTERSUNK. BELT RIVET. WAGON BOX HEAD. CONE HEAD. ROSE HEAD. TRUSS HEAD.

ESTABLISHED 1865.

J. H. Sternbergh & Son, READING PA.

MANUFACTURERS OF
BOLTS, NUTS, WASHERS, RIVETS,

Including Machine Bolts, Carriage Bolts, Bridge Bolts and Car Bolts,
THE HARVEY PATENT GRIP-THREAD TRACK BOLT, Soft Steel Bolts with Cold Rolled Thread, Bolt Ends, Turnbuckles, Sleeve Nuts, Lag Screws, Set Screws and Tap Bolts and every variety of screwed work.
BOILER, BRIDGE AND SHIP RIVETS, Square and Hexagon Nuts of all kinds and sizes, Plate Washers, Belt Lacing Machines, Rods and Irons for Bridges and Buildings, Merchant Bar Iron, etc., etc.
Branch Establishment, **THE KANSAS CITY BOLT & NUT CO.,** Kansas City, Mo.



PORTCHESTER BOLT & NUT CO.

Port Chester, N. Y.

MANUFACTURERS OF

BOLTS, NUTS, RIVETS and WASHERS

CHAMFERED AND TRIMMED.

SQUARE AND HEXAGON NUTS A SPECIALTY.



CLASSIFIED LIST OF ADVERTISERS.

Agricultural Implements.

Sickles, Sweet & Lyon, 35 Barclay St., N. Y.

Air Compressors.

Norwalk Iron Works, S. Norwalk, Conn.
Rand Drill Co., 28 Park Place, N. Y.

Air Moving Machinery.

Howard & Morse, 45 Fulton, N. Y.

Aluminum.

Illinois Pure Aluminum Co., Lemont Ill.
Pittsburgh Reduction Co., Pittsburgh.
Scovill Mfg. Co., Waterbury, Conn.

Aluminum, Brass and Bronze.

Gaylord, F. L. Co., Ansonia, Conn.
Haight & Clark, Albany, N. Y.
Pratt & Cady Co., Hartford, Conn.
St. Louis Bronze & Aluminum Works, St. Louis, Mo.

Analytical Chemists.

Britton, J. Blodgett, Philadelphia, Pa.
Moore, Dr. Gideon E., 221 Pearl St., N. Y.

Anti-Friction Metals.—See Babbitt Metal.

Anvils.

Eagle Anvil Works, Trenton, N. J.
Anvil and Vise (Combination),
Fulton Iron & Engine Works, Detroit, Mich.

Apple Parers.

Goodell Co., Antrim, N. H.

Arms and Ammunition.

Hartley & Graham, 313 & 315 Broadway, New York.
Ideal Mfg. Co., New Haven, Conn.
Stevens, J., Arms and Tool Co., Chicopee Falls, Mass.

Union Metallic Cartridge Co., 813 & 815 Broadway, N. Y.

Auctioneers.

Bissell, E. Son & Co., N. Y.

Axes.

Peck, A. G. & Co., Cohoes, N. Y.

Axles, Springs, &c., Manufacturers of.

Wauder Steel Dept. of Cambria Iron Co., Johnstown, Pa.
Wurster, F. W. & Co., Brooklyn, N. Y.

Babbitt Metal.

Crown Smelting Co., Chester, Pa.
Hertz, T. Son, St. Louis, Mo.
Keys, W. W. & R. M. Co., Bridgeport, Conn.

Bakers and Roasters.

Bronson Supply Co., Cleveland, Ohio.

Bale Ties.

Kilmer Mfg. Co., Newburg, N. Y.

Barb Wire and Fence.

Wauder Steel Dept. of Cambria Iron Co., Johnstown, Pa.
Indiana Wire Fence Co., Crawfordsville, Ind.

Kilmer Mfg. Co., Newburg, N. Y.

Ludlow-Saylor Wire Co., St. Louis, Mo.
Washburn & Moen Mfg. Co., Worcester, Mass.

Bar Iron, Manufacturers of.

Standard Iron & Steel Co., Bridgeport, Conn.
Allentown Rolling Mill, Allentown, Pa.
Burden Iron Co., Troy, N. Y.

Crescent Horse Shoe & Iron Co., Max Meadows, Va.
Montour Iron & Steel Co., Danville, Pa.
Mahoning Valley Iron Co., Youngstown, Ohio.

Sternberg, J. B. & Son, Reading, Pa.

Bellows, Manufacturers of.
Scott, Geo. M., Chicago, Ill.

Bells.

Sevin Bros. Mfg. Co., East Hampton, N. Y.

Belt Dressing.

Jos. Dixon Crutcher Co., Jersey City, N. J.

Belt Fasteners.

Bristol Co., Waterbury, Conn.
Claffen Mfg. Co., Cleveland, Ohio.
Talcott, W. O., Providence, R. I.

Belting, Makers of.

Alexander Bros., 412 N. 3d., Phila.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Engineering Co., Phila., Pa.

Main Belting Co., Philadelphia, Pa.
N. Y. Belting & Packing Co., Ltd., N. Y.
Roberts Mfg. Co., Pittsburgh, Pa.
Shultz Belting Co., St. Louis, Mo.
Stanley Works, New Britain, Conn.

Bending Rolls.

Wickes Bros., Saginaw, Mich.

Bicycle Locks.

Dieffenbacher, W. H. & Co., Chicago, Ill.

Bicycles and Bicycle Sundries.

Bevin Bros. Mfg. Co., E. Hampton, Mass.
Bridgeport Gun Implement Co., 313-315 Broadway, New York.

Bronson Supply Co., Cleveland, O.
Dieffenbacher, W. H. & Co., Chicago, Ill.

Eagle Bicycle Mfg. Co., Torrington, Ct.
Grand Rapids Cycle Co., Grand Rapids, Mich.

Haines & Zimmermann, 407 Cherry Street, Philadelphia.

Heath, S. F. Cycle Co., Minneapolis, Minn.

League Cycle Co., Hartford, Conn.
Lovell, Jno. P. Arms Co., Boston, Mass.

Monarch Cycle Co., Chicago, Ill.
Pope Mfg. Co., Boston, Mass.

Read, Wm. & Sons, Boston, Mass.
Stearns, E. C. & Co., Syracuse, N. Y.

Sterling Cycle Works, Chicago, Ill.
Stokes Mfg. Co., Chicago, Ill.
Toledo Metal Wheel Co., Toledo, O.

Bicycle Pumps.

Heath, S. F. Cycle Co., Minneapolis, Minn.

Books, Tackle, Makers of.

Cleveland Block Co., Cleveland, O.
Fulton Iron & Engine Works, Detroit, Mich.

Blowers.

Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.

Sturtevant, E. F. & Co., Boston, Mass.

Boiler Plates.

Carbon Steel Co., Pittsburgh, Pa.
McIlvain, Wm. & Sons, Reading, Pa.

Lukens Iron & Steel Co., Coatesville, O.
Pottstown Iron Co., Pottstown, Pa.

Boilers, Copper.

Randolph & Clowes, Waterbury, Conn.

Boilers, Steam.

Baccock & Wilcox Co., 30 Cortlandt, Harrison Safety Boiler Wks., Phila., Pa.

Potlouch, W. B. & Co., Youngstown, O.
Southward Fdy. & Mch. Co., Phila., Pa.

Sterling Co., Chicago, Ill.
Wetherill, Robt. & Co., Chester, Pa.

Bolt Cutters.

Chambers Bros. Co., Philadelphia.

Howard Iron Works, Buffalo, N. Y.
Reece, Edw. F., Greenfield, Mass.

Wells Bros. Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.

Books.

Williams, David, 96-102 Reade, N. Y.
Wolcott & West, Syracuse, N. Y.

Boring Machines.

Buckeye Mfg. Co., Union City, Ind.

Box Straps and Corners.

Cary Mfg. Co., 9 to 11 Elm St., N. Y.

Boxes, Hdw. Shelf, &c.

Green, A. H., 22 Park Place, Phila., Pa.
Jones, Jesse & Co., Philadelphia, Pa.

Brass, Manufacturers of.

Ansonia Brass & Copper Co., N. Y.
Davol, John & Sons, 100 John, N. Y.

Plume & Atwood Mfg. Co., N. Y.
Randolph & Clowes, Waterbury, Conn.

Rome Brass & Copper Co., Rome, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

Waterbury Brass Co., 296 B'way, N. Y.

Brass Butt Hinges.

Tiebout, W. & J., 16 & 18 Chambers, N. Y.

Brass Founders.

Best, Fox & Co., Pittsburgh, Pa.
Cramp, Wm. & Sons, 8 & E. B. Co., Philadelphia, Pa.

Eynon-Evans Mfg. Co., Philadelphia.

Fralin, E. T., Lancaster, Pa.
Haight & Clark, Albany, N. Y.

Keys, W. W. & R. M. Co., Bridgeport, Conn.
North Bros. Mfg. Co., Phila., Pa.

Reeves, Paul S., Philadelphia.

Brass Goods.

Grass Goods Mfg. Co., 88 Chambers, N. Y.

Bridge Builders.

Berlin Iron Bridge Co., East Berlin, Ct.

Bronze (Tobin).

Ansonia Brass & Copper Co., 19-26 Cliff Street, N. Y.

Brooms and Brushes.

Bromwell Brush & Wire Goods Co., Cincinnati, Ohio.

Builders' Hardware.

Cornin, P. & F., New Britain, Conn.
Deitz, A. E., 97 Chambers St., N. Y.

Reading Hdw. Co., Reading, Pa.
Vale & Towne Mfg. Co., Stamford, Ct.

Butchers' Steels.

Chaudron, John & Sons, 85-89 Cliff St., N. Y.

Hoffman, C. & A., Philadelphia, Pa.

Butcher and Shoe Knives, Manufacturers of.

Chaudron, John & Sons, 85-89 Cliff St., N. Y.

Goodell Co., Antrim, N. H.
Wilson, John, Sheffield, England.

Butts and Hinges.

McKinney Mfg. Co., Allegheny, Pa.
Sabin Machine Co., Montpelier, Vt.

Stanley Works, New Britain, Conn.
Tiebout, W. & J., 16 Chambers, N. Y.

Calipers and Dividers.

Hogson & Pettis Mfg. Co., New Haven, Conn.

J. Stevens Arms and Tool Co., Chicopee Falls, Mass.

Starrett, L. S., Athol, Mass.

Car Axles.

Roberts, A. & P. & Co., Phila.

Carboy Stands.

Hillebrand & Wolf, Philadelphia, Pa.

Carriage Hardware, Makers of.

Cover's Saddlery Works, Farmer, N. Y.
Eccles, Richard, Auburn, N. Y.

McKinnon, Dash & Hdw. Co., Ltd., Buffalo, N. Y.

Scranton Forging Co., Scranton, Pa.
Smith, H. D. & Co., Plantsville, Conn.

Wilcox & Howe Co., Birmingham, Conn.

Cartridge Reloading Tools.

Ideal Mfg. Co., New Haven, Conn.

Carvers' Tools.

White, Van Glahn & Co., 15-17 Chatham Square, N. Y.

Casters, Wheel, &c.

Clark, G. P., Windsor Locks, Conn.

Castings Cleaning Apparatus.

Tilghmans Patent Sand Blast Co., Ltd., Sheffield, England.

Castings, Iron and Steel.

Booth, The Lloyd Co., Youngstown, O.
The Burr & Houston Co., Brooklyn, N. Y.

Cheney, S. & Son, Manlius, N. Y.
Chester Steel Casting Co., Phila.

Chrome Steel Works, Brooklyn, N. Y.
Eureka Cast Steel Co., Chester, Pa.

Flagg, Stanley G. & Co., Phila.
Garland Foundry Co., Cleveland, O.

Haight & Clark, Albany, N. Y.
King & Andrews Co., Chicago, Ill.

Parkers & De Mooy, Cleveland, O.
Pratt & Cady Co., Hartford, Conn.

Sessions Foundry Co., Bristol, Conn.
Spencer's (S. S.) Sons, Guilford, Conn.

Standard Fdy. & Mfg. Co., Cleveland, O.
Standard Steel Casting Co., Thurlow, Pa.

Union Lock & Hdw. Co., Ltd., Lancaster, Pa.

Western Fdy. Co., Chicago, Ill.
Wetherill, Robt. & Co., Chester, Pa.

Castings, Malleable.

Arcade Malleable Iron Co., Worcester, Mass.

Burgess & Loxley, Buffalo, N. Y.
Dartmouth Malleable Iron Co., Dayton, O.

Hammer & Co., Branford, Conn.

Chains.

Bradlee & Co., Philadelphia.

Kelley & McBean, Niagara Falls, N. Y.
Link-Belt Engineering Co., Phila., Pa.

McKay, Jas. & Co., Pittsburgh, Pa.

Chimneys.

Phila. Engineering Works, Phila., Pa.

Chisels, Manufacturers of.

Auck Bros., Millbury, Mass.

Buck, Chas., Millbury, Mass.
White, L. & J. J. Co., Buffalo, N. Y.

Clacks.

Cushman Chuck Co., Hartford, Conn.

Hogson & Pettis Mfg. Co., New Haven, Conn.

Smith & Egge Mfg. Co., Bridgeport, Conn.

Union Mfg. Co., 103 Chambers, N. Y.

Whitton, D. E. Mach. Co., New London, Conn.

Clamps.

Hammer & Co., Branford, Conn.

Le Count, C. W., So. Norwalk, Conn.

Clipping Machines.

Field, Alfred & Co., 93 Chambers St., N. Y.

Coal.

Garns, C. K. & Co., Philadelphia, Pa.

Wister, Francis, Philadelphia, Pa.

Coke.

Garns, C. K. & Co., Philadelphia, Pa.

Hendricks Bros., 49 Cliff, N. Y.

New Haven Copper Co., 294 Pearl, N. Y.

Randolph & Clowes, Waterbury, Conn.

Rome Brass & Copper Co., Rome, N. Y.

Wister, Francis, Philadelphia, Pa.

Cordage.

Samson Cordage Works, Boston, Mass.

Cork Screws.

Wilmington, C. T. Wire Novelty Co., Newark, N. J.

Corrugated Furnaces.

Continental Iron Wks., Brooklyn, N. Y.

Corrugated Iron.

Cambridge Corrugating Co., Piqua, O.

Cambridge Roofing Co., Cambridge, Mass.

Mosley Iron Bridge & Roof Co., 61 N. Y.

N. Y. Iron Roofing & Corrugating Co., Jersey City, N. J.

Counting Machines.

Durant, W. N., Milwaukee, Wis.

Coverings, Boiler and Pipe.

Johns, H. W. Mfg. Co., 87 Maiden Lane, N. Y.

Cranes.

Detroit Foundry Equipment Co., Detroit, Mich.

Balsey, W. S. & Co., Birdsboro, Pa.

Harrington, E. Son & Co., Phila., Pa.

Maris & Beekley Philadelphia, Pa.

Ridgway, Craig & Sons, Coatesville, Pa.

Sellers, Wm. & Co., Inc., Phila., Pa.

Yale & Towne Mfg. Co., Stamford, Conn.

Cupolas, Hot Blast.

Byram & Co., Detroit, Mich.

Detroit Fdry. Equipment Co., Detroit, Mich.

Curry Combs.

Gibbs Mfg. Co., Canton, O.

Cutlery Cases.

Torrey, J. R. & Co., Worcester, Mass.

Cutlery Enamel.

Shipley, A. B. & Son, Phila., Pa.

Cutlery, Importers of.

Field, Alfred & Co., 93 Chambers St., New York.

Gurney, Fred B., 116 Chambers St., N. Y.

Sickles, Sweet & Lyon, 35 Barclay, N. Y.

Cutlery, Manufacturers of.

Bingham, W. Co., Cleveland, Ohio.

Dame, Stoddard & Kendall, Boston, Mass.

Goodell Co., Antrim

- Egg Beaters.**
North Bros. Mfg. Co., Philadelphia.
- Electric Bells and Supplies.**
Ostrander, W. R. & Co., 204 Fulton St. New York
Wollensak, J. F., Chicago, Ill.
- Electric Dynamo Machines.**
Edy Electric Mfg. Co., Windsor Conn.
- Elevators, Makers of.**
Link-Belt Engineering Co., Phila., Pa.
Morse, Williams & Co., Phila., Pa.
- Emery and Emery Wheels.**
N. Y. Belting & Packing Co., Ltd., N. Y.
Northampton Emery Wheel Co., Leeds, Mass.
Norton Emery Wheel Co., Worcester, Mass.
Sturtevant Mill Co., Boston, Mass.
- Emery Wheel Dressers.**
Bay State Stamping Co., Worcester, Mass.
- Enamels.**
Nabian Iron Enamel Co., Cragin, Ill.
- Engineers and Contractors.**
Alken Henry, Pittsburgh, Pa.
Artificial Gas Engineering Co., Pitts-
burgh, Pa.
Herrick, J. A., 284 Pearl St., N. Y.
Kennedy, Julian, Pittsburgh, Pa.
Laughlin, Alex. & Co., Pittsburgh, Pa.
Lean, D. R., Co., Pittsburgh, Pa.
McClure, Amster & Co., Pittsburgh, Pa.
Pittsburgh Iron & Steel Engineer-
ing Co., Pittsburgh, Pa.
Smythe, S. K. Co., Incorporated Pitts-
burgh, Pa.
Swindell, W. & Bros., Pittsburgh, Pa.
- Engines, Gas.**
Otto Gas Engine Works, Phila., Pa.
Rollason Gas Engine, Havemayer Bldg.,
N. Y.
- Engines, Steam, Makers of.**
Bass Foundry & Machine Works, Ft.
Wayne, Ind.
Buckeye Engine Co., Salem, O.
Erie Engine Works, Erie, Pa.
Norwalk Iron Works Co., So. Norwalk,
Conn.
Penna. Diamond Drill & Mfg. Co.,
Birdsboro, Pa.
Phila. Engineering Works, Phila., Pa.
Southwark Foundry and Machine Co.,
Phila., Pa.
Tod, William & Co., Youngstown, O.
Totten & Bogg Iron & Steel Fdry Co.,
Pittsburgh, Pa.
Werner, H. Robt. & Co., Chester, Pa.
- Exhaust Tumblers.**
Sweater, W. A., Brookton, Mass.
- Expansion Bolts.**
Boone, W. C. Mfg. Co., Boonton, N. J.
Church, Isaac, Toledo, O.
Steward & Romaine Mfg. Co., Phila.,
Pa.
- Faucets, Self-Measuring.**
Lane Bros., Poughkeepsie, N. Y.
- Faucets, Wooden, Makers of.**
John Sommer's Son, Newark, N. J.
- Feed-Water Heaters.**
Davis, I. B. & Son, Hartford, Conn.
Goubert Mfg. Co., 32 Cortlandt St., N. Y.
Harrison Safety Boiler Wks., Phila., Pa.
National Pipe Bending Co., New
Haven, Conn.
Taunton Locomotive Mfg. Co., Taun-
ton, Mass.
Webster, Warren & Co., Camden, N. J.
Whitlock Coil Pipe Co., Elmwood,
Conn.
- Fencing, Iron and Wire.**
Barnum, E. T., Detroit, Mich.
Champion Iron Co., Kenton, O.
Cleveland Fence Co., Indianapolis, Ind.
Clinton Wire Cloth Co., Clinton, Mass.
Gilbert & Bennett Mfg. Co., 42 Cliff St.,
Klimmer Mfg. Co., Newburgh, N. Y.
Maest, Foss & Co., Springfield, O.
The Van Dorn Iron Works Co., Clevel-
and, O.
- File Cards.**
Fraser Co., 19 Warren St., N. Y.
- Files, Importers of.**
Moss, F. W., 80 John, N. Y.
- Files and Rasps, Manufacturers of.**
Arcade File Works, Anderson, Ind.
Barker & White, Troy, N. Y.
Barnett, G. & H., 41 & 43 Richmond
Phila.
McCaffrey File Co., Philadelphia.
Nicholson File Co., Providence R. I.
- Fire Brick, Makers of.**
Borger, Cyrus, Philadelphia, Pa.
Gardner, Jas. & Son, Cumberland, Md.
Kreischer & Sons, Foot St., N. Y.
McLeod & Henry Co., Troy, N. Y.
Maurer, H. & Son, 23d, N. Y.
Ostrander Fire Brick Co., Troy, N. Y.
Solomon, J. W., 10 Wilmington, Del.
Valentine, M. L. & Bro., Woodbridge.
- Fishing Tackle.**
Dane, Stouard & Kendall, Boston,
Mass.
- Flint.**
Crystal Mills Co., Chester, Mass.
- Flint and Emery Paper.**
Baeder, Adamson & Co., Phila., Pa.
- Fly Traps.**
Bromwell Brush & Wire Goods Co.,
Cincinnati, Ohio.
- Flue Cleaners.**
Mackey, Jas. T., St. Louis, Mo.
- Fodder Cutters.**
Silver Mfg. Co., Salem, O.
- Forges, Portable, &c.**
Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Lan-
caster, Pa.
Foss Mfg. Co., Springfield, Ohio.
Sturtevant, E. S. Co., Boston, Mass.
- Forgings, Iron and Steel.**
Bethlehem Iron Co., S. Bethlehem, Pa.
Cambria Steel-Cambria Iron Co.,
Johnstown, Pa.
Frankford Steel Co., Phila., Pa.
Scranton Forging Co., Scranton, Pa.
U. S. Projectile Co., Brooklyn, N. Y.
- Foundry Facings.**
Dixon, Jos., Crucible Co., Jersey City,
N. J.
Obermayer Co., Cincinnati, O.
Smith, J. D. Fdy. Supply Co., Cinnc., O.
Solomon, Jno. M., Wilmington, Del.
- Foundry Riddles.**
Estey, W. S., 65 Fulton, N. Y.
- Foundry Supplies.**
Diamond Clamp & Flask Co., Rich-
mond, Ind.
Obermayer Co., Cincinnati, O.
Smith, J. D. Fdy. Supply Co., Cinnc., O.
- Friction Clutches.**
Keystone Clutch & Mch. Wks., Phila.,
Pa.
Moore & White Co., Philadelphia, Pa.
- Friction Cone.**
Evans Friction Cone Co., Boston, Mass.
- Furnaces, Foundry.**
Byram & Co., Detroit, Mich.
- Gas Governors.**
N. Y. Gas Saving Co., Decker Building,
Union Square, N. Y.
- Gas Producers.**
Wood, R. D. & Co., Philadelphia, Pa.
- Gas & Steam Fitters' Supplies.**
Pancoast, Henry B. & Co., Phila., Pa.
- Gauge, Rolling Mill.**
Haines Gauge Co., Philadelphia, Pa.
- Gear Cutters.**
D. M. Whiton Mach. Co., New London,
Conn.
- Gears.**
Boston Gear Works, Boston, Mass.
Poole, Robt. & Son Co., Baltimore,
Md.
U. S. Projectile Co., Brooklyn, N. Y.
- Glass Boards.**
Canton Saw Co., Canton, O.
- Glass Cutters.**
Monroe, S. G., Bristol, Conn.
- Glue.**
Baeder, Adamson & Co., Phila., Pa.
Dodd, A. W. & Co., Gloucester, Mass.
Kussia Cement Co., Gloucester, Mass.
- Grass Catchers.**
Supplee Hardware Co., Phila., Pa.
- Grinding Mills.**
Foss Mfg. Co., Springfield, O.
- Grinding and Polishing Ma-
chines.**
Norton Emery Wheel Co., Worcester
Mass.
- Grindstone Dressing Machinery.**
Blake & Johnson, Waterbury, Conn.
- Grindstones.**
Cleveland Stone Co., Cleveland, O.
- Gunpowder, Makers of.**
Latin & Hand Powder Co., 29 Murray
St., N. Y.
- Hand Carts.**
Lansing Wheelbarrow Co., Lansing,
Mich.
- Handles.**
New York Mallet and Handle Wks.,
466 E. Houston St., N. Y.
- Handle Couplings.**
Bourke Mfg. Co., Youngstown, O.
- Hangers, Door.**
Chicago Spring Butt Co., Chicago, Ill.
Coburn Trolley Track Mfg. Co.,
Holyoke, Mass.
Lane Bros., Poughkeepsie, N. Y.
Victor Mfg. Co., Newburyport, Mass.
- Hardware Comm'n Merchants.**
Doecher, Martin, 88 Chambers, N. Y.
Field, Alfred & Co., 93 Chambers St.,
N. Y.
Graham, John H. & Co., 111 Chambers
St., New York.
Jacobus, W. H., 90 Chambers, N. Y.
- Hardware Manufacturers.**
Stearns, E. C. & Co., Syracuse, N. Y.
Union Mfg. Co., 103 Chambers, N. Y.
Yale & Towne Mfg. Co., Stamford,
Conn.
- Hardware Mfrs.' Agents.**
Bingham, W. Co., Cleveland, O.
Clarke, Thomas, St. John, N. B.
Graham, John H. & Co., 113 Chambers,
Sickles Sweet & Lyon, 35 Barclay, N. Y.
- Hardware Specialties.**
Acme Shear Co., Bridgeport, Conn.
Bergner Bros., Philadelphia, Pa.
Enterprise Mfg. Co., Philadelphia, Pa.
Ette & Henger Mfg. Co., St. Louis, Mo.
Haines & Zimmerman, Phila., Pa.
Johnson, S. C., Racine, Wis.
Knapp & Cowles Mfg. Co., Bridgeport,
Conn.
North Bros. Mfg. Co., Philadelphia, Pa.
Peabody & Parks, Troy, N. Y.
Scranton & Co., New Haven, Conn.
Wilson, J. Fred, Worcester, Mass.
- Harness Snaps,**
Covert Mfg. Co., West Troy, N. Y.
Coverts' Saddlery Wks., Farmer, N. Y.
Fitch, W. & E. T., New Haven, Conn.
- Hoisting Machines.**
Box, Alfred & Co., 314 Green, Phila.
Brown Hoisting & Conveying Mch. Co.
Cleveland, Ohio.
Fulton Iron & Engine Wks., Detroit,
Mich.
Harrington, E., Son & Co., Phila.
Lane Bros., Poughkeepsie, N. Y.
Lidgerwood Mfg. Co., 96 Liberty, N. Y.
McCoy, Jos. F. & Co., 28 Warren St.
Maris & Beekley, Philadelphia.
Moore Mfg. & Fdy. Co., Milwaukee, Wis.
Morse, Williams & Co., Phila.
Sellers, Wm. & Co., Phila. and N. Y.
Spidel, J. G., Reading, Pa.
Yale & Towne Mfg. Co., Stamford, Ct.
- Hollow Ware.**
Avery Stamping Co., Cleveland, O.
Bronson Supply Co., Cleveland, Ohio.
Cleveland Stamping & Tool Co., Clevel-
and, O.
Stuart & Peterson Co., Phila., Pa.
- Hollow Ware, Aluminum.**
Illinois Pure Aluminum Co., Lemont, Ill.
- Horse Nails, Makers of.**
Capewell Horse Nail Co., Hartford,
Conn.
National Horse Nail Co., Vergennes, Vt.
Piscum Nail Co., Neponset, Boston,
Mass.
- Horse and Mule Shoes, Makers of.**
Bryden Horse Shoe Co., Catsauqua,
Pa.
Burden Iron Co., Troy, N. Y.
Crescent Horse Shoe & Iron Co., Max
Meadows, Va.
Diamond State Iron Co., Wilmington,
Del.
Old Dominion Iron & Nail Works Co.,
Richmond, Va.
Phoenix Horse Shoe Co., Poughkeepsie,
N. Y.
Rhode Island Perkins Horse Shoe Co.,
Providence.
Shoenberger & Co., Pittsburgh, Pa.
Standard Horse Shoe Co., Boston,
Mass.
- Hose Menders.**
Cleveland Rubber Works, Cleveland, O.
Hudson, C. E. & Co., Leominster, Mass.
- Hose.**
N. Y. Belting & Packing Co., Ltd., 16
Park Row, N. Y.
- Hydrants, &c.**
McLean, John, 296 & 298 Monroe, N. Y.
- Hydraulic Forging.**
U. S. Projectile Co., Brooklyn, N. Y.
- Hydraulic Jacks.**
Dudgeon, Richard, 24 Columbia, N. Y.
McCoy, Jos. F. Co., 28 Warren St., N. Y.
Watson & Stillman, 204 E. 43d, N. Y.
- Ice Breakers.**
Clement & Dunbar, Philadelphia, Pa.
Wharton, J. S. Lovering, Phila., Pa.
- Ice Cream Freezers.**
Clement & Dunbar, Phila., Pa.
North Bros. Mfg. Co., Phila., Pa.
Packer, C. W., Philadelphia, Pa.
White Mountain Freezer Co., Nashua,
N. H.
- Injectors.**
Eynon-Evans Mfg. Co., Philadelphia,
Pa.
Jenkins Bros., New York
- Insurance, Boiler.**
Hartford Steam Boiler Inspection &
Insurance Co., Hartford Conn.
- Iron and Steel, Swedish.**
Lundberg, Gustaf, Boston, Mass.
Milre, A. & Co., 1 Broadway, N. Y.
- Iron Commission Brokers.**
Corning, Edw. & Co., 29 B'way, N. Y.
Cotton, Barclay W. & Co., Phila.
Etting, Edw. J., Philadelphia.
Hokan, John L. & Co., Philadelphia.
Hoffman, J. W. & Co., Philadelphia.
Levia, Henry & Co., Philadelphia.
Keeley, Jerome & Co., Philadelphia.
Lea, J. Tatnall & Co., Philadelphia.
Mohr, J. J., 430 Walnut, Philadelphia.
Pilling & Crane, Philadelphia, Pa.
Wister, L. & R. & Co., Phila., Pa.
- Iron Ore.**
Samuel, Frank, Philadelphia, Pa.
- Iron, Merchants.**
Barnes, C. K. & Co., Philadelphia, Pa.
Borden & Lovell, 70 West, N. Y.
Busseus & Cunliffe, Philadelphia.
Corning Edw. & Co., 29 B'way, N. Y.
Cox, Justice, Jr., Philadelphia.
Cotton, Barclay W. & Co., Phila.
Hoffman, J. W. & Co., Philadelphia.
Leonard, J., 448 West St., N. Y.
Nicolls, Wheeler & Co., Philadelphia.
Ogden & Wallace, 85 Elm St., N. Y.
Pierson & Co., 29 Broadway, N. Y.
Thomson, W. H. & Co., Phila., Pa.
Wallace, Wm. H. & Co., Albany &
Washington streets, N. Y.
Whitney, A. R. & Co., 47 B'way, N. Y.
Wilson, E. H. & Co., Philadelphia.
- Iron, Importers.**
Abbott Wheelock & Co., N. Y. and Boson.
Lundberg, Gustaf, Boston, Mass.
- Iron, Sheet, Manufacturers of.**
Cambridge Iron & Steel Co., Cambridge,
Ohio
W. Dewees Wood Co., Lim., McKee
port, Pa.
- Iron Vases.**
Walbridge & Co., Buffalo, N. Y.
- Ironwork, Ornamental.**
Barnum, E. T., Detroit, Mich.
Champion Iron Co., Kenton, O.
Ludlow-Saylor Wire Co., St. Louis, Mo.
Maest, Foss & Co., Springfield, O.
The Van Dorn Iron Works Co., Clevel-
and, O.
- Keys.**
Wollensak, J. F., Chicago, Ill.
- Ladders, Rolling.**
Coburn Trolley Track Mfg. Co.,
Holyoke, Mass.
- Ladles.**
Detroit Fdy. Equipment Co., Detroit
Mich.
- Lamps.**
Plume & Atwood Mfg. Co., New York.
Standard Lighting Co., Cleveland, O.
- Lamp Stoves.**
Glazier Stove Co., Chelsea, Mich.
Plume & Atwood Mfg. Co., 18 Murray
Street, New York.
- Lanterns.**
Steam Gauge & Lantern Co., Syracuse,
N. Y.
- Lathes.**
Draper Machine Tool Co., Worcester
Mass.
Johnson, Israel H., Jr., & Co., Phila-
delphia, Pa.
Seneca Falls Mfg. Co., Seneca Falls,
N. Y.
- Lathing, Wire.**
Clinton Wire Cloth Co., Clinton, Mass.
N. J. Wire Cloth Co., Trenton, N. J.
Wright & Colton Wire Cloth Co., Wor-
cester, Mass.
- Laundry Machines.**
Johnson, S. C., Racine, Wis.
- Lawn Mowers.**
Blair Mfg. Co., Springfield, Mass.
Chadborn & Coldwell Mfg. Co., New
burgh, N. Y.
Coldwell Lawn Mower Co., Newburg,
N. Y.
Dille & McGuire Mfg. Co., Richmond,
Ind.
Enterprise Mfg. Co., Philadelphia, Pa.
F. & N. Mfg. Co., Richmond, Ind.
Henley, M. C., Richmond, Ind.
Maest, Foss & Co., Springfield, O.
Philadelphia Lawn Mower Co., Phila-
delphia, Pa.
Supplee Hdw. Co., Phila., Pa.
- Lawn Rakes.**
Gibbs Mfg. Co., Canton, Ohio.
Konier, F. E. & Co., Canton, O.
- Lawn Sprinklers.**
Ette & Henger Mfg. Co., St. Louis
Gibbs Mfg. Co., Canton, Ohio.
McGowan, John H. Co., Cincinnati
Portland Lawn Sprinkler Co., Port-
land, Me.
- Lemon Squeezers.**
Ripley Mfg. Co., Unionville, Conn.
- Letters and Figures, Metallic.**
White, A. A. & Co., Providence, R. I.
- Letters, Paper.**
Tablet & Ticket Co., Chicago, Ill.
- Levels.**
Richardson, O. F. & Son Athol, Mass.
- Locks and Knobs, Manufacturers of.**
Jetta, A. E. & W. Chambers, N. Y.
Reading Hdw. Co., Reading, Pa.
Smith & Egge Mfg. Co., Bridgeport, Conn.
Yale & Towne Mfg. Co., Stamford, Conn.
- Lubricants.**
Dixon, Jos., Crucible Co. Jersey City
N. J.
- Machinery.**
Am. Tool Works, Cleveland, Ohio.
Barnes, W. F. & John, Rockford, Ill.
Bement, Miles & Co., Philadelphia, Pa.
Bigelow, C. E., 46 Dey, N. Y.
Signal & Keeler Mfg. Co., St. Louis.
Bliss, E. W. Co., Brooklyn, N. Y.
Bridgeport Mch. Tool Works, Bridge-
port, Conn.
Briggs, Marvin, 12 Broadway, N. Y.
Carlin's Sons, Thos., Allegheny, Pa.
Clapp, Geo. M., apt. 74 Cortlandt, N. Y.
Detrick & Harvey Mch. Co., Balti-
more, Md.
Fitchburg Mch. Works, Fitchburg,
Mass.
Garvin Mch. Co., Light & Canal Sts.
Gould & Eberhardt, Newark, N. J.
Hamilton Mch. Tool Co., Hamilton, O.
Harrington, E. Son & Co., Phila., Pa.
Hender, A. L., Wilmington, Del.
Hender Machine Co., Torrington, Ct.
Hill, Clarke & Co., Boston, Mass.
Howard & Morse, 45 Fulton St., N. Y.
Hulbut-Rogers Mch. Co., South Sud-
bury, Mass.
Johnson, Israel H., Jr., & Co., Phila.
Jones & Lamson Mch. Co., Springfield,
Vt.
Lovegrove & Co., Philadelphia, Pa.
McCabe, J. J., 68 Cortlandt, N. Y.
Machinists Supply Co., Rochester, N. Y.
Manville, E. J. Mch. Co., Waterbury,
Conn.
Newark Mch. Tool Works, Newark, N. J.
New Haven Mch. Co., New Haven, Conn.
Niles Tool Wks., 138 Liberty St., N. Y.
Pittsburgh Mfg. Co., Pittsburgh, Pa.

- Place, Geo., 120 Broadway, N. Y.
 Poole, Robt. & Son Co., Baltimore, Md.
 Powell Planer Co., Worcester, Mass.
 Pratt & Whitney Co., Hartford, Conn.
 Prentiss Tool & Supply Co., N. Y.
 Scranton Supply & Mchry. Co., Scranton, Pa.
 Sellers, Wm. & Co., Phila.
 Seyfert's Sons L. F., Philadelphia, Pa.
 Steptoe, J. & Co., Cincinnati, O.
 Stow Flexible Shaft Co., Ltd., Phila.
 Toomey, Frank, Philadelphia, Pa.
 Wetherill, Robert & Co., Chester, Pa.
 Wickes Bros., Saginaw, Mich.
 Wilson, W. A., Rochester, N. Y.
- Machinery for Hardware Manufacturers.**
 Add. Jno. & Son, New Haven, Conn.
- Machine Knives.**
 Loring Coes & Co., Worcester, Mass.
 Loyd, John, 558-562 Water St., N. Y.
- Machine Tools.—See Machinery.**
- Machine Work.**
 Papping, J., 68th St., & 11th Ave., N. Y. City.
- Machinists' Scales.**
 Coffin & Leighton, Syracuse, N. Y.
 Starrett, L. S., Athol, Mass.
- Machinists' Tools and Supplies.**
 King, J. M. & Co., Waterford, N. Y.
 Sellers, Wm. & Co., Inc., Phila.
- Mallets.**
 N. Y. Mallet & Handle Works, N. Y.
- Mangles.**
 Johnson, S. C., Racine, Wis.
- Manufacturing Sites.**
 Illinois Central R. R., Chicago, Ill.
- Measuring Tapes.**
 Keuffel & Esser Co., New York.
 Lufkin Rule Co., Saginaw, Mich.
- Mechanical Instruction.**
 Correspondence School of Mechanics
 Scranton, Pa.
- Metals.**
 Fearing, Wm. S., 100 Chambers N. Y.
 Hendricks Bros., 49 Cliff, N. Y.
- Metal Brokers.**
 American Metal Co., N. Y.
- Metallurgists.**
 Britton J. Blodgett, Phila., Pa.
- Mining Knives.**
 Palmer Edw. Mfg. Co., Troy, N. Y.
- Mine Lamps.**
 Darby, Edw. & Sons, Phila. Pa.
 Leonard, B. E., Scranton, Pa.
- Mining Screens.**
 Harrington & King Perforating Co., Chicago, Ill.
 Howard & Morse, 45 Fulton, N. Y.
- Models, Makers of.**
 Franklin, H. H. Mfg. Co., Syracuse, N. Y.
 Ideal Machine Works, Hartford, Conn.
 Rhodes, L. E. Co., Hartford, Conn.
- Molding Sand.**
 Obermayer, S. Co., Cincinnati, O.
- Motors, Water and Electric.**
 O. & C. Electric Co., 402 and 404 Greenwich St., N. Y.
 Dallett, Thos. H. & Co., Phila., Pa.
- Nail Machinery.**
 Pittsburgh Mfg. Co., Pittsburgh, Pa.
- Nail Pullers.**
 Scranton & Co., New Haven, Conn.
- Nails (Cut) and Spikes.**
 Borden & Lovell, 70 West, N. Y.
 Cumberland Nail & Iron Co., Phila.
 Oxford Iron Co., 81 Washington.
 Pottstown Iron Co., Pottstown, Pa.
 Riverside Iron Wks., Wheeling, W. Va.
 Valley Steel Co., St. Louis, Mo.
- Nickel Platers' Supplies.**
 Eddy Electric Mfg. Co., Windsor, Conn.
- Norway Shapes, Rollers of.**
 Rowland, William & Harvey, Frankford, Philadelphia
- Novelty Manufacturers.**
 Franklin, H. H. Mfg. Co., Syracuse, N. Y.
 Ideal Machine Works, Hartford, Conn.
- Nut Machines.**
 Ounham Nut Co., Unionville, Ct.
- Nuts, Bolts, &c., Makers of.**
 American Bolt Co., Lowell, Mass.
 American Screw Co., Providence, R. I.
 Blake & Johnson, Waterbury, Conn.
 Dunham Nut Co., Unionville, Conn.
 Jaseell, Wm. H. Co., Pawtucket, Mass.
 Mt. Carmel Bolt Co., Mt. Carmel, Conn.
 Pennsylvania Bolt & Nut Co., Lebanon, Pa.
 Port Chester Bolt and Nut Co., Port Chester, N. Y.
 Russell, Burdell & Ward, Port Chester
 Sternberg, J. B. & Son, Reading, Pa.
 Wilson, J. Fred, Worcester, Mass.
 Wm. H. Haskell Co., Pawtucket, R. I.
- Oilers.**
 Wilnot & Hobbs Mfg. Co., Bridgeport Conn.
- Oil Stones.**
 Pike Mfg. Co., Pike Station, N. H.
- Oil Stoves.**
 Glacier Stove Co., Chelsea, Mich.
- Ores.**
 Wister, Francis, Philadelphia, Pa.
- Ox-Bow Pins.**
 Sawyer, O. C., Sharon, Vt.
- Ox Shoes.**
 Scranton Forging Co., Scranton, Pa.
- Packing.**
 Morrison, Robert, St. Louis, Mo.
 N. Y. Belting & Packing Co., Ltd., N. Y.
- Padlocks.**
 Ames Sword Co., Chicopee, Mass.
 Fraim, E. T., Lancaster, Pa.
 Hillebrand & Wolf, Phila., Pa.
 Shultz Mfg. Co., Phila., Pa.
- Paint.**
 Garry Iron & Steel Roofing Co., Cleveland, O.
- Paint Burners.**
 Dangler Stove & Mfg. Co., Cleveland, O.
- Paint Cans.**
 Wilnot & Hobbs Mfg. Co., Bridgeport, Conn.
- Pants Stretcher.**
 Covert Mfg. Co., West Troy, N. Y.
- Patent Solicitors.**
 Butler, C. N., Phila., Pa.
 Dowson & Howson, Phila. & Washington
 Jenner, H. W. T., Washington, D. C.
 Jefferies, E. B., Washington, D. C.
- Perforated Metal.**
 Clinton Wire Cloth Co., Clinton, Mass.
 Harrington & King Perforating Co., Chicago, Ill.
 Hendrick Mfg. Co., Ltd., Carbondale, Pa.
- Phosphor Bronze.**
 Phosphor Bronze Smelting Co., Limited, Philadelphia.
- Phosphor Tin.**
 Crescent Phosphorized Metal Co., Philadelphia, Pa.
 Walk & Naumann, 516 Pearl, N. Y.
- Picks and Mattocks.**
 Plumbo, Fayette R., Philadelphia, Pa.
- Pig Iron.**
 Houston, C. B. & Co., Philadelphia, Pa.
 Montour Iron & Steel Co., Danville, Pa.
 Taylor & Co., 45 Wall, N. Y.
 Philing & Crane, Philadelphia, Pa.
 Samuel, Frank, Philadelphia, Pa.
- Pig Iron Storage.**
 Am. Pig Iron Storage Warrant Co., 44 Wall, N. Y.
- Pile Drivers.**
 Vulcan Iron Wks., Chicago, Ill.
- Pipe, Bent.**
 National Pipe Bending Co., New Haven
- Pipe Cutting and Threading Machines.**
 Blinnell & Keeler Mfg. Co., St. Louis, Mo.
 Merrill Mfg. Co., Toledo, O.
 Pencoast Henry B. & Co., Philadelphia, Pa.
 Saunders' Sons, D., Yonkers, N. Y.
 Walworth Mfg. Co., Boston, Mass.
- Pipe Grips.**
 Prentiss vise Co., 44 Barclay, N. Y.
- Pipes, Fittings, &c. Makers of.**
 McNab & Harlan Mfg. Co., N. Y.
- Pipe, Water and Gas, Makers of.**
 Cumberland Nail & Iron Co., Phila. Pa.
 Donaldson Iron Co., Emmaus, Pa.
 Riverside Iron Works, Wheeling, W. Va.
 Wood, R. D. & Co., Philadelphia, Pa.
- Plane Irons, Manufacturers of.**
 Buck Bros., Millbury, Mass.
 Buck, Chas., Millbury, Mass.
- Planes, Manufacturers of.**
 Stanley Rule & Level Co., N. Y.
- Plated Ware.**
 Boardman, J. & Son New Haddar Ct
 Holmes & Edwards Silver Co., Bridgeport, Conn.
 Rogers, Wm. Mfg. Co., Hartford, Ct.
- Plate, Iron and Steel, Mfrs. of.**
 A. A. Standard Iron & Steel Co., Bridgeport, O.
 Lukens Iron & Steel Co., Coatesville, Pa.
 Mahoning Valley Iron Co., Youngstown, Ohio.
 Moorhead-McLean Co., Pittsburgh, Pa.
 Mullvain & Sons, Reading, Pa.
 Pottstown Iron Co., Pottstown, Pa.
 Pottsville Iron & Steel Co., Pottsville, Pa.
 Singer, Nimick & Co., Pittsburgh, Pa.
 The Mahoning Valley Iron Co., Youngstown, O.
 Wellman Iron & Steel Co., Thurlow, Pa.
 Woodman Co., Philadelphia.
- Plating, Nickel, Brass and Silver.**
 Wilnot & Hobbs Mfg. Co., Bridgeport, Conn.
- Plow Shares.**
 Star Mfg. Co., Carpentersville, Ill.
- Pokes.**
 Bishop, A. W., Berea, Ohio.
- Polishing Machines.**
 Watson & Stillman, 204 E. 43d, N. Y.
- Post Hole Diggers.**
 Buckeye Mfg. Co., Union City, Ind.
 Gibbs Mfg. Co., Canton, Ohio.
 Wister, L. & R. & Co., Philadelphia, Pa.
- Poultry Nettings.**
 Barnum, E. T., Detroit, Mich.
 Gilbert & Bennett Mfg. Co., 42 Cliff St., N. Y.
 N. J. Wire Cloth Co., Trenton, N. J.
 "Silver Finish."
 Tyler Wire Wks. Co., W. S., Cleveland, O.
 Wright & Colton Wire Cloth Co., Worcester, Mass.
- Powder.**
 Ladin & Rand Powder Co., 29 Murray
 New York Powder Co., 62 Liberty St., N. Y.
- Power Hack Saws.**
 Millers Falls Co., 93 Reade St., N. Y.
- Power Hammers.**
 Olenet & Eisenhardt, Philadelphia.
 Dupont Mfg. Co., St. Johnsburg, Vt.
 Jenkins & Huzia, Heliopolis, Pa.
 Scranton & Co., New Haven, Conn.
- Presses, Dies, &c.**
 E. W. Bliss Co., Brooklyn, N. Y.
 Crosby, G. A. & Co., Chicago, Ill.
 Stark Mch & Tool Co., Buffalo, N. Y.
 Stiles & Parker Press Co., Brooklyn, N. Y.
 Waterbury Mch. Co., Waterbury, Conn.
- Presses, Power, Makers of.**
 Bliss, E. W. Co., Brooklyn, N. Y.
 Manville, E. J. Mch. Co., Waterbury, Ct.
 Stark Mch. & Tool Co., Buffalo, N. Y.
 Waterbury Farrel Foundry and Machine Co., Waterbury, Conn.
- Pruners.**
 Topliff & Ely Co., Elyria, Ohio.
- Pulleys.**
 Keystone Clutch Mch. Wks., Phila., Pa.
 Lake, J. H. & D. Co., Massillon, Ohio.
- Pumping Machinery.**
 Dean Bros. Steam Pump Works, Indianapolis, Ind.
 Hooker-Colville Steam Pump Co., St. Louis, Mo.
 McGowan, J. H. & Co., Cincinnati, O.
 Maslin, J. & Son, Jersey City, N. J.
 Norwalk Iron Wks. Co., So. Norwalk, Conn.
 Southward Fdy. & Mch. Co., Phila., Pa.
 Valley Pump Wks., Easthampton, Mass.
 Worthington, Henry R., 86 & 88 Liberty St., N. Y.
- Pumps, Makers of.**
 Bellevue Pump Co., Bellevue, Iowa.
 Denning Co., Salem, O.
 Douglas, W. & B., Middletown, Conn.
 Mast, Foss & Co., Springfield, O.
 Myers, F. E. & Bro., Ashland, O.
- Punches.**
 Richards, I. P., Providence, R. I.
- Punches and Shears, Hand and Power.**
 E. W. Bliss Co., Brooklyn, N. Y.
 Crosby, G. A. & Co., Chicago, Ill.
 Cross & Speirs Machine Co., Waterbury, Conn.
 Henderson, A. L., Wilmington, Del.
 Stark Mch. & Tool Co., Buffalo, N. Y.
 Stiles & Parker Press Co., Brooklyn, N. Y.
 Waterbury Farrel Foundry and Mch. Co., Waterbury, Conn.
 Watson & Stillman, 204 E. 43d, N. Y.
- Rails, Old and New.**
 Perry, W. H. & Co., Providence, R. I.
- Rat and Mouse Traps.**
 Estey, W. S. 65 Fulton, N. Y.
 Ripley Mfg. Co., Unionville, Conn.
- Razors.**
 J. R. Torrey Razor Co., Worcester, Mass.
- Reels.**
 Hendryx, A. B. Co., New Haven, Conn.
- Refrigerator Door Fasteners.**
 Conroy, P. J. & Co., Philadelphia.
- Refrigerators.**
 Challenge Corn Planter Co., Grand Haven, Mich.
- Rivets.**
 Blake & Johnson, Waterbury, Conn.
 Boyce Rivet Co., Muncie, Ind.
 Rurden Iron Co., Tr. Y., N. Y.
 Clark & Cowles, Plainville, Conn.
 Cobb & Drew, Plymouth, Mass.
 Sternberg, J. B. & Son, Reading, Pa.
 Townsend, W. P. & Co., New Brighton, Pa.
- Riveting Machines.**
 Add. Jno. & Sons, New Haven, Conn.
- Rock Drills.**
 Sand Drill Co., 23 Park Place, N. Y.
- Rolling Mill Machinery.**
 Birmingham Iron Fdry, Birmingham, Conn.
 Booth, The Lloyd Co., Youngstown, Pa.
 Leechburg Foundry & Mch. Co., Pittsburgh, Pa.
 Morgan Construction Co., Worcester, Mass.
 Robinson-Rea Mfg. Co., Pittsburgh, Pa.
 Totten & Hogg Iron and Steel Fdry Co., Pittsburgh, Pa.
 Trethewey Mfg. Co., Pittsburgh, Pa.
 Waterbury Farrel Foundry & Mch. Co., Waterbury, Conn.
- Rolls, Chilled, Sand and Steel.**
 Birmingham Iron Foundry, Birmingham, Conn.
 Booth, The Lloyd Co., Youngstown, O.
 East Chicago Fdy Co., Chicago, Ill.
 Garrison, A. Fdy. Co., Pittsburgh, Pa.
 Robinson-Rea Mfg. Co., Pittsburgh, Pa.
 Seaman, Sleseth & Black, Pittsburgh, Pa.
 Totten & Hogg Iron and Steel Fdry Co., Pittsburgh, Pa.
- Roofing.**
 Berlin Iron Bridge Co., E. Berlin, Conn.
 Cambridge Roofing Co., Cambridge, O.
 Cincinnati Corrugating Co., Piquette, O.
 Johns, H. W. Mfg. Co., 87 Maiden Lane, N. Y.
 Iron Roofing & Corrugating Co., Jersey City, N. J.
- Rope and Web Goods.**
 Covert Mfg. Co., West Troy, N. Y.
 Covert's Saddlery Wks., Farmer, N. Y.
- Rope Wheels.**
 Cresson, Geo. V. Co., Philadelphia, Pa.
- Rubber Goods.**
 Canfield, H. O., Bridgeport, Conn.
- Rules, Manufacturers of.**
 Keuffel & Esser Co., New York.
 Lufkin Rule Co., Saginaw, Mich.
 Stanley Rule & Level Co., 29 Chambers
- Rust Preventive.**
 Bridgeport Gun Implement Co. 313-315 Broadway, N. Y.
- Sand Paper.**
 Baeder, Adamson & Co., Phila., Pa.
- Sash Balances.**
 Caldwell Mfg. Co., Rochester, N. Y.
 Palman Sash Balance Co., Rochester, N. Y.
 Stearns, E. C. & Co., Syracuse, N. Y.
- Sash Cords and Chains.**
 Morton, Thos., 65 Elizabeth, N. Y.
 Ossawan Mills Co., Norwich, Conn.
 Samson Cordage Works, Boston, Mass.
 Smith & Egge, Mfg. Co., Bridgeport, Conn.
- Sash Locks.**
 Ives, H. B. & Co., New Haven, Conn.
- Sash Pulleys.**
 Palmer Hardware Mfg. Co., Troy, N. Y.
- Sash Weights.**
 Brown, E. E. & Co., Philadelphia, Pa.
 Norton Bros., Chicago, Ill.
- Saw Filing Machines.**
 Disston, Henry & Sons, Philadelphia, Pa.
- Saws, Makers of.**
 Disston, Henry & Sons, Phila., Pa.
 National Saw Co., 86 Reade St., N. Y.
 Simonds Mfg. Co., Fitchburg, Mass.
- Saw Vises.**
 Seneca Falls Mfg. Co., Seneca Falls, N. Y.
- Saw Sets.**
 Taintor Mfg. Co., 84-86 Chambers N. Y.
- Scales, Manufacturers of.**
 Buffalo Scale Co., Buffalo, N. Y.
 Chatillon, John & Sons, 85-89 Cliff, N. Y.
- Scrapers, Road.**
 Am. Steel Scraper Co., Sidney, Ohio.
 Kilbourne & Jacobs Mfg. Co., Columbus, O.
 Sidney Steel Scraper Co., Sidney, O.
- Screens, Coal and Ore.**
 Hendrick Mfg. Co., Ltd., Carbondale, Pa.
- Screens, Door and Window.**
 Phillips, A. J. & Co., Fenton, Mich.
 White, Van Gahm & Co., 15-17 Chatham Sq., N. Y.
- Screw Cutting Machinery.**
 Wells Bros. & Co., Greenfield, Mass.
 Wiley & Russell Mfg. Co., Greenfield, Mass.
- Screw Drivers.**
 Brown, R. H. & Co., New Haven, Conn.
 Maynew, A. H. Co., Shelbourne Falls, Mass.
- Screw Plate and Pipe Cutter.**
 Jarecki Mfg. Co., Erie, Pa.
- Screws, Makers of.**
 American Screw Co., Providence, R. I.
 Blake & Johnson, Waterbury, Conn.
 Wm. H. Haskell Co., Pawtucket, Mass.
 Miles, J. S., 205 Quarry, Philadelphia.
 Reynolds & Co., New Haven, Conn.
 Worcester Machine Screw Co., Worcester, Mass.
- Scroll Saws.**
 Barnes, W. F. & John, Rockford, Ill.
 Seneca Falls Mfg. Co., Seneca Falls, N. Y.
- Scythe Stones and Whetstones.**
 Pike Mfg. Co., Pike Station, N. H.
 Cleveland Stone Co., Cleveland, O.
- Shafting, Makers of.**
 Cresson, Geo. V. Co., Philadelphia, Pa.
 Fairmount Mch. Co., Philadelphia, Pa.
 Fitzsimons & Co., Cleveland, Ohio.
 Sellers, Wm. & Co., Inc., Phila., Pa.
 Stow, Co. Mfg., Pinghamton, N. Y.
- Shaped Iron and Steel, Manufacturers of.**
 Aetna-Standard Iron & Steel Co., Bridgeport.
 East Chicago Fdy Co., Chicago, Ill.

See Alphabetical Index, Pages 95 & 96.

- Allentown Rolling Mill.** Allentown, Pa.
Lockhart Iron & Steel Co., Pittsburg, Pa.
Passaic Rolling Mill Co., Paterson, N.J.
Pottsville Iron & Steel Co., Pottsville, Pa.
Roberts, A. & P. & Co., Phila., Pa.
The Phoenix Iron Co., Phila., Pa.
- Shears and Scissors.**
Asme Shear Co., Bridgeport, Conn.
Heinrichs, R. Sons Co., Newark, N. J.
- Sheet Iron and Steel, Manufacturers of.**
Atna-Standard Iron and Steel Co., Bridgeport, O.
Cambridge Iron & Steel Co., Cambridge, Ohio.
Chess Bros., Pittsburgh, Pa.
Mahoning Valley Iron Co., Livingston, Ohio.
Moorehead-McCleane Co., Pittsburgh, Pa.
Pierson & Co., 29 Broadway, N. Y.
Singer, Nimick & Co., Ltd., Pittsburgh, Pa.
The Mahoning Valley Iron Co., Youngstown, O.
Alan Wood Co., Philadelphia.
W. Dewees Wood Co., McKeesport, Pa.
- Sheet Zinc.**
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
- Sinks.**
Douglas, W. & B., Middletown, Conn.
- Skates, Ice.**
Lovell, Jno. P. Arms Co., Boston, Mass.
Winslow, Sam'l., Skate Mfg. Co., Worcester, Mass.
- Skates, Roller.**
Henley, M. C., Richmond, Ind.
Winslow, Sam'l., Skate Mfg. Co., Worcester, Mass.
- Smelting Works.**
Reeves, Paul S., 760 S. Broad, Phila.
- Soldering Coppers.**
Clendenin Bros., Baltimore, Md.
Covert Mfg. Co., West Troy, N. Y.
- Speaking Tubes.**
Ostrander, W. R. & Co., 204 Fulton St., N. Y.
Wollensak, J. F., Chicago, Ill.
- Specialties, Pat. Articles.**
Rhodes, L. E. Co., Hartford, Conn.
- Spelter.**
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
Missouri Metal Co., St. Louis, Mo.
- Spoons and Forks.**
Boardman, L. & Son, New Haddam, Conn.
Holmes & Edwards Silver Co., Bridgeport, Conn.
Bogers, The Wm. Mfg. Co., Hartford, Conn.
- Sporting Goods.**
Hartley & Graham, 313-315 B'way, N. Y.
- Spring Hinges.**
Clark & Cowles, Plainville, Ct.
Dunbar Bros., Bristol, Conn.
Miller & Van Winkle, Brooklyn, N. Y.
Morgan Spring Co., Worcester, Mass.
Roland, Wm. & Harvey, Phila., Pa.
Sabin Machine Co., Montpelier, Vt.
Washburn & Moen Mfg. Co., Worcester, Mass.
Wolff, R. H. & Co., Ltd., 118th St. and Harlem River, N. Y.
- Spring Hinges.**
Chicago Spring Butt Co., Chicago, Ill.
Pullman Sash Balance Co., Rochester, N. Y.
Stover Mfg. Co., Freeport, Ill.
Van Wagoner & Williams Co., 14 Warren St., N. Y.
- Stamped Ware.**
Am. Stamping Co., 104 & 106 John St., New York.
- Stamping Works.**
Avery Stamping Co., Cleveland, O.
Cleveland Stamping & Tool Co., Cleveland, O.
- Staples.**
Cobb & Drew, Plymouth, Mass.
Titchener E. H. & Co., Binghamton, N. Y.
- Steam Gauges.**
Bristol Co., Waterbury, Conn.
- Steam Hammers, &c., Makers of.**
Diebolt & Eisenhardt, Philadelphia.
Dudgson, Richard, 24 Columbia Street, N. Y.
Trethewey Mfg. Co., Pittsburgh, Pa.
- Steam Heating.**
Webster Warren & Co., Camden, N. J.
- Steam Separators.**
Gouvert Mfg. Co., 32 Cortland St., N. Y.
Harrison Safety Boiler Wks., Phila., Pa.
- Steel, Cold Rolled Strip.**
Superior Steel Co., Pittsburgh, Pa.
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
- Steel Figures and Alphabets.**
Krogsrud, W., 61 Fulton N. Y.
- Steel Importers.**
Abbott, Wheelock & Co., N. Y. and Boston.
Hobson, Francis, Seaman & Co., 97 John St., N. Y.
Jessop, Wm. & Sons, Sheffield, Eng. land, or 91 John, N. Y.
Milne, A. & Co., 1 Broadway, N. Y.
Newton & Shipman, 88 John, N. Y.
Wetherell Bros., 93 Liberty St., N. Y.
Whitney, A. R. & Co., B'dway, N. Y.
Wolff, R. H. & Co., Ltd., 118th St. and Harlem River, N. Y.
- Steel (Mushet's Special).**
Jones, B. M. & Co., Boston.
- Steel Manufacturers.**
Atna-Standard Iron & Steel Co., Bridgeport, O.
Bethlehem Iron Co., S. Bethlehem, Pa.
Baker, Herman & Co., 103 Duane St. Carbon Steel Co., Pittsburgh, Pa.
Chesler Steel Castings Co., Phila., Pa.
Chrome Steel Works, Brooklyn, N. Y.
Crecent Steel Co., Pittsburgh, Pa.
Frankford Steel Co., Philadelphia.
Gautier Steel Department of Cambria Iron Co., Johnstown, Pa.
Hobson, Francis, Seaman & Co., 97 John St., N. Y.
Jessop, Wm. & Sons, Sheffield, Eng. land, or 91 John, N. Y.
Kayser, Ellison & Co., Sheffield, Eng. land.
La Belle Steel Co., Pittsburgh, Pa.
Lukens Iron & Steel Co., Coatesville, Pa.
Moorehead-McCleane Co., Pittsburgh, Pa.
Moss, F. W., 83 John N. Y.
Pottsville Iron and Steel Co., Pottsville, Pa.
Rowland, Wm. & Harvey, Frankford, Philadelphia.
Singer, Nimick & Co., Pittsburgh.
Steel & Iron Improvement Co., Pittsburgh, Pa.
Superior Steel Co., Pittsburgh, Pa.
Valley Steel Co., St. Louis, Mo.
Wordlaw, S. & Co., Sheffield, Eng.
Wetherell Bros., 93 Liberty, N. Y.
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
- Steel, Manufacturers' Agents.**
Barnes, C. K. & Co., Philadelphia, Pa.
Corning, Edw. & Co., 29 B'way, N. Y.
Lindsay, Jas. G. & Co., Phila., Pa.
Pierson & Co., 29 Broadway, N. Y.
- Steel Rails, Manufacturers of.**
Bethlehem Iron Co., S. Bethlehem, Pa.
Cambria Iron Co., Johnstown, Pa.
Montour Iron & Steel Co., Danville, Pa.
Riverside Iron Wks., Wheeling, W. Va.
- Steel, Tool.**
Frankford Steel Co., Philadelphia, Pa.
Jessop, Wm. & Sons, Sheffield, Eng. land, or 91 John, N. Y.
Jones, B. M. & Co., Boston, Mass.
La Belle Steel Co., Pittsburgh, Pa.
- Step Ladders.**
Bicycle Step Ladder Co., Chicago, Ill.
Croissant, M., Albany, N. Y.
- Stocks and Dies.**
Armstrong Mfg. Co., Bridgeport, Conn.
Billings & Spencer Co., Hartford, Conn.
Butterfield & Co., Derby Line, Vt.
Hart Mfg. Co., Cleveland, O.
Saunders' Sons, D., Yonkers, N. Y.
Wells Bros. & Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.
- Stove Linings.**
Ostrander Fire Brick Co., Troy, N. Y.
- Stove Pipe Thimbles.**
Cheney, S. & Son Manlius, N. Y.
- Street Lamps.**
Steam Gauge & Lantern Co., Syracuse, N. Y.
- Strops.**
J. R. Torrey & Co., Worcester, Mass.
- Structural Iron Work.**
Berlin Iron Bridge Co., East Berlin, Conn.
Lindsay, Jas. G. & Co., Phila., Pa.
- Sulphuric Acid.**
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
- Tacks, Brads, Staples, &c.**
Atlas Tack Corporation, Boston, Mass.
Clendenin Bros., Baltimore, Md.
Cobb & Drew, Plymouth, Mass.
Grand Crossing Tack Co., Grand Crossing, Ill.
- Taps and Dies.**
Eutterfield & Co., Derby Line, Vt.
Carpenter, J. H., Tap & Die Co., Pawtucket, R. I.
Manning, Maxwell & Moore, 111 Liberty St., N. Y.
Wells Bros. & Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.
- Testing Laboratories.**
Riehl Bros. Testing Mch. Co., Philadelphia.
- Testing Machines.**
Atchle Bros. Testing Mch. Co., Phila.
- Theatrical Hardware.**
Wollensak, J. F., Chicago, Ill.
- Thill Springs.**
Frost Thill Spring Co., Boston, Mass.
Sabin Machine Co., Montpelier, Vt.
- Timber and Mineral Lands.**
Robertson, E. Co., Cincinnati, O.
- Time Record.**
Scattergood, R. W., Phila., Pa.
- Tin Plate Machinery.**
Lloyd Booth Co., Youngtown, Ohio.
- Tinware.**
Am. Stamping Co., 104 & 106 John St., New York.
- Tire Upsetters.**
Butts & Ordway, Boston, Mass.
- Toe Calks, Steel.**
Burke, P. F., Boston, Mass.
- Tool Blocks.**
Hulbut-Rogers Mch. Co., South Sudbury, Mass.
- Tool Chests.**
Am. Tool Co., 200 W. Houston St., N. Y.
- Tool Holders.**
Armstrong Bros. Tool Co., Chicago, Ill.
- Tools.**
Britton, Horace E., Stoughton, Mass.
Brown, R. H. & Co., New Haven, Conn.
Fraser Co., 19 Warren St., New York.
Hurley Bros., Hartford, Conn.
Mayhew, H. H. Co., Shelburne Falls, Mass.
Millers Falls Co., 98 Reads, N. Y.
Richardson, C. F. & Son, Athol, Mass.
Stanley Rule & Level Co., 29 Chambers, New York.
Wilkinson, A. J. & Co., Boston, Mass.
- Tools, Blacksmith and Wheelwrights.**
Buffalo Forge Co., Buffalo, N. Y.
Butts & Ordway, Boston, Mass.
Champion Blower & Forge Co., Lancaster, Pa.
Plumb, Fayette R., Philadelphia, Pa.
Wiley & Russell Mfg. Co., Greenfield, Mass.
- Tools, Steam and Gas Fitters.**
Saunders' Sons, D., Yonkers, N. Y.
- Torches, Oil and Gasoline.**
Danster Stove & Mfg. Co., Cleveland, O.
Schneider & Trenkamp Co., Cleveland, Ohio.
Standard Lighting Co., Cleveland, O.
- Transom Litters.**
Wollensak, J. F., Chicago, Ill.
- Tricycles.**
Toledo Metal Wheel Co., Toledo, Ohio.
- Trucks, Manufacturers of.**
Clark, G. P., Windsor Locks, Conn.
Lansing Wheelbarrow Co., Lansing, Mich.
- Tubes, Seamless Drawn Copper.**
Ansonia Brass & Copper Co., 19 and 21 Cliff, N. Y.
Randolph & Clowes, Waterbury, Conn.
- Tubes, Steel.**
Ellwood Shafting & Tube Co., Ellwood City, Pa.
Lang's John S. Son & Co., 4 Fletcher St., New York.
U. S. Projectile Co., Brooklyn, N. Y.
- Tumbling Barrels.**
Henderson Bros., Waterbury, Conn.
- Turnbuckles.**
Cleveland City Forge & Iron Co., Cleveland, O.
Merrill Bros., Brooklyn, E. D.
- Twist Drills, Makers of.**
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford, Mass.
New Process Twist Drill Co., Taunton, Mass.
Standard Tool Co., Cleveland.
- Valves, Gas, Water and Steam.**
Best, Fox & Co., Pittsburgh, Pa.
Chapman Valve Mfg. Co., Boston.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
Jenkins Bros., 71 John, N. Y.
Lunkenheimer Co., Cincinnati, O.
McNab & Martin Mfg. Co., 56 John, N. Y.
- Ventilator Appliances.**
Howard & Morse, 45 Fulton, N. Y.
- Vise Jaws.**
Newark Mch. Tool Co., Newark, N. J.
- Vises.**
Athol Machine Co., Athol, Mass.
Hollands Mfg. Co., Erie, Pa.
Howard Iron Works, Buffalo, N. Y.
Millers Falls Co., 98 Reads St., N. Y.
Trentise Vise Co., 44 Barclay St., N. Y.
Van Wagoner & Williams Co., Warren St., N. Y.
- Wagon Jacks.**
Covert Mfg. Co., West Troy, N. Y.
Covert's Saddlery Works, Farmer, N. Y.
- Washers.**
Haskell, Wm. H. Co., Pawtucket, R. I.
Milton Mfg. Co., Milton, Pa.
Sternbergh, J. H. & Son, Reading, Pa.
- Washing Machines.**
Benbow Mfg. Co., St. Louis, Mo.
Richmond Cedar Works, Richmond, Va.
- Water Meters.**
Worthington, Henry R., 86 & 88 Liberty St., N. Y.
- Water Wheels.**
Poole, Robt. & Son Co., Baltimore, Md.
- Well Buckets.**
Richmond Cedar Works, Richmond, Va.
- Wheelbarrows.**
Amer. Steel Scraper Co., Sidney, Ohio.
Byran Mfg. Co., Byran, Ohio.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Lansing Wheelbarrow Co., Lansing, Mich.
Sidney Steel Scraper Co., Sidney, O.
- Window Cord, Makers of.**
Samsen Cordage Works, Boston, Mass.
- Wire, Manufacturers of.**
Gautier Steel Department of Cambria Iron Co., Johnstown, Pa.
Miller & Van Winkle, Brooklyn, N. Y.
New Castle Wire Nail Co., New Castle, Pa.
New Haven Wire Mfg. Co., New Haven, Conn.
Salem Wire Nail Co., Salem, Vt.
Trenton Iron Co., Trenton, N. J.
Washburn & Moen Mfg. Co., Worcester.
Wetherell Bros., 93 Liberty St., F. Y.
Wolff, R. H. & Co., Ltd., 118th St. and Harlem River, N. Y.
Wright & Colton Wire Cloth Co., Worcester, Mass.
- Wire Cloth.**
Barnum, E. T., Detroit, Mich.
Clinton Wire Cloth Co., Clinton, Mass.
Darby, Edward & Sons, Philadelphia.
Estey, W. S., 65 Fulton, N. Y.
Gilbert & Bennett Mfg. Co., 42 Cliff.
Howard & Morse, 45 Fulton, N. Y.
N. J. Wire Cloth Co., Trenton, N. J.
Scheeler & Sons, Buffalo, N. Y.
Wickwire Bros., Corland, N. Y.
Wright & Colton Wire Cloth Co., Worcester, Mass.
W. S. Tyler Wire Works Co., Cleve'd.
- Wire Cutters.**
Higganum Hdw. Co., Higganum, Conn.
King, J. M. & Co., Watertown, N. Y.
- Wire Dies.**
McFarland, Wm., Trenton, N. J.
Newton & Shipman, 83 John, N. Y.
- Wire Fences, See Fencing, Iron and Wire.**
- Wire Goods, Manufacturers of.**
Bromwell Brush & Wire Goods Co., Cincinnati, Ohio.
Darby, Edward & Sons, Phila.
Gilbert & Bennett Mfg. Co., 42 Cliff St., N. Y.
Ludlow-Saylor Wire Co., St. Louis.
Ossawan Mills Co., Norwich, Conn.
Scheeler & Sons, Buffalo, N. Y.
Wickwire Bros., Corland, N. Y.
Williamson, C. T. Wire Novelty Co., Newark, N. J.
- Wire Machinery.**
Am. Tool Wks., Cleveland, O.
Manville, E. J. Mch. Co., Waterbury, Ct.
Morgan Construction Co., Worcester, Mass.
Waterbury Mch. Co., Waterbury, Conn.
- Wire Straightening and Cutting Machinery.**
Att. John & Son, New Haven, Conn.
- Wire Nails.**
Bond Nail Co., Raynham, Mass.
Indiana Wire Fence Co., Crawfordsville, Ind.
Kilmer Mfg. Co., Newburg, N. Y.
New Castle Wire Nail Co., New Castle, Pa.
Phillips, Townsend & Co., Phila.
Salem Wire Nail Co., Salem, O.
Taunton Wire Nail Co., Taunton, Mass.
Wainey, A. M. & Co., New York, N. Y.
- Wire Rods, Steel.**
New Castle Wire Nail Co., New Castle, Pa.
Washburn & Moen Mfg. Co., Worcester, Mass.
Whitney, A. R. & Co., 17 B'way, N. Y.
Wolff, R. H. & Co., Ltd., 118th St. and Harlem River, N. Y.
- Wire Rope, Iron and Steel, Makers.**
Broderick & Bascom Rope Co., St. Louis, Mo.
California Wire Works, San Francisco.
Hazard Mfg. Co., Wilkesbarre, Pa.
A. Leach & Sons Rope Co., St. Louis.
Trenton Iron Co., Trenton, N. J.
Washburn & Moen Mfg. Co., Worcester, Mass.
Williamsport Wire Rope Co., Williamsport, Pa.
- Wood-Working Machinery.**
Fay, J. A. & Co., Cincinnati, O.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.
Wilkinson, A. J. & Co., Boston, Mass.
- Wrenches, Manufacturers of.**
Bemis & Call Hardware & Tool Springfield, Mass.
Billings, Spencer & Co., Hartford, Conn.
Coxes Wrench Co., Worcester, Mass.
Trimont Mfg. Co., Roxbury, Mass.
Walworth Mfg. Co., Boston, Mass.
Williams, J. H., Brooklyn, N. Y.
- Wringers.**
Colby Wringer Co., Montpelier, National Wringer Co., Canton, O.

ALPHABETICAL INDEX TO ADVERTISERS.

Abbott, Wheelock & Co.....	17	Buck, Chas.....	65	Cross & Speirs Machine Co.....	37	Gurney, F. B.....	65
Acme Shear Co.....	65	Buckeye Engine Co.....	28	Crown Smelting Co.....	3	Haigh & Clark.....	24
Adt, John & Son.....	35	Buckeye Mfg Co.....	67	Crystal Mills Co.....	63	Haines & Zimmermann.....	68
Ætna-Standard Iron & Steel Co.....	19	Buffalo Forge Co.....	98	Cumberland Nail & Iron Co.....	16	Haines Gauge Co.....	24
Aiken, Henry.....	26	Buffalo Scale Co.....	84	Cushman Chuck Co.....	41	Halk & Naumann.....	3
Alexander Bros.....	34	Burden Iron Co.....	81	Dallett, Thos. H. & Co.....	43	Halsey, Jas. T.....	41
Allentown Rolling Mills.....	27	Burgess & Loxley.....	98	Dame, Stoddard & Kendall.....	67	Halsey, W. S. & Co.....	23
Am. Bolt Co.....	86	Burke, P. F.....	83	Dangler Stove & Mfg. Co.....	70	Hamilton Machine Tool Co.....	46
Am. Metal Co.....	3	Burr & Houston Co.....	22	Darby, Edw. & Sons.....	8	Hammer & Co.....	8½
Am. Pig Iron & Storage Warrant Co.....	18	Bussenius & Cunliffe.....	48	Davis, I. B. & Son.....	32	Hardware Board of Trade.....	51
Am. Screw Co.....	12	Butler, C. N.....	6	Davol, John & Sons.....	2	Harrington, E., Son & Co.....	45
Am. Stamping Co.....	75	Butterfield & Co.....	41	Dayton Malleable Iron Co.....	98	Harrington & King Perforating Co.....	9
Am. Steel Scraper Co.....	86	Butts & Ordway.....	43	Dean Bros. Steam Pump Works.....	33	Harrison Safety Boiler Wks.....	28
Am. Tool Co.....	74	Byram & Co.....	27	Deitz, A. E.....	85	Hart Mfg. Co.....	41
American Tool Works.....	48	C. & C. Electric Co.....	29	Deming Co.....	58	Hartford Steam Boiler Insp. and Ins.	29
Ames Sword Co.....	78	Caldwell Mfg. Co.....	78	Detrick & Harvey Machine Co.....	45	Hartley & Graham.....	1
Ansonia Brass & Copper Co.....	2	California Wire Works.....	6	Detroit Foundry Equipment Co.....	25	Haskell, Wm. H. Co.....	90
Arcade File Works.....	62	Cambria Iron Co.....	18	Diamond Clamp & Flask Co.....	98	Hazard Mfg. Co.....	6
Arcade Malleable Iron Co.....	21	Cambridge Iron & Steel Co.....	19	Diamond State Iron Co.....	81	Heath, S. F. Cycle Co.....	69
Armstrong Bros. Tool Co.....	46	Cambridge Roofing Co.....	14	Dieffenbacher, W. H. & Co.....	69	Heinisch's R. Sons Co.....	65
Armstrong Mfg. Co.....	60	Canfield, H. O.....	35	Dille & McGuire Mfg. Co.....	88	Henderer, A. L.....	36
Artificial Gas Engineering Co.....	26	Canton Saw Co.....	70	Diston, Henry & Sons.....	61	Henderson Bros.....	22
Athol Machine Co.....	59	Capewell Horse Nail Co.....	82	Dixon, Jos., Crucible Co.....	35	Hendry Machine Co.....	54
Atlas Tack Corporation.....	10	Carbon Steel Co.....	19	Dodd, A. W. & Co.....	97	Hendricks Bros.....	2
Avery Stamping Co.....	53	Carlin's Sons, Thomas.....	48	Donaldson Iron Co.....	22	Hendrick Mfg. Co., Ltd.....	7
Babcock & Wilcox Co.....	31	Carpenter, J. M. Tap & Die Co.....	97	Doscher, Martin.....	65	Hendryx, A. B. Co.....	3
Raeder, Adamson & Co.....	56	Cary Mfg. Co.....	69	Douglas, W. & B.....	58	Henley, M. C.....	88
Banker & White.....	63	Chadborne & Coldwell Mfg. Co.....	88	Draper Machine Tool Co.....	48	Herrick, J. A.....	27
Bardsley, J.....	84	Challenge Corn Planter Co.....	73	Dudgeon, Richard.....	39	Hertz, T. & Son.....	13
Barns, C. K. & Co.....	21	Chambers Bros. Co.....	90	Dunbar Bros.....	5	Higginum Hdw. Co.....	76
Barnes, W. F. & John.....	37	Champion Blower & Forge Co.....	41	Dunham Nut Co.....	88	Hillebrand & Wolf.....	36
Barnett, G. & H.....	63	Champion Iron Co.....	7	Dupont Mfg. Co.....	36	Hill, Clarke & Co.....	49
Barnum, E. T.....	8	Chapman Valve Mfg. Co.....	30	Durant, W. N.....	34	Hobson, F., Seaman & Co.....	17
Bass Foundry & Machine Works.....	28	Chatillon, John & Sons.....	74	Dwight Slate Machine Co.....	40	Hoffman, C. & A.....	64
Bay State Stamping Co.....	46	Cheney, S. & Son.....	22	Eagle Anvil Works.....	71	Hoffman, J. W. & Co.....	16
Bellevue Pump Co.....	59	Chess Bros.....	22	Eagle Bicycle Mfg Co.....	97	Hogan, John L. & Co.....	16
Bement, Miles & Co.....	38	Chester Steel Casting Co.....	23	East Chicago Foundry Co.....	53	Hoggson & Pettis Mfg. Co.....	60
Bemis & Call Hardware & Tool Co.....	84	Chicago Spring Butt Co.....	76	Eccles, Richard.....	79	Hollands Mfg. Co.....	59
Benbow Mfg. Co.....	70	Chrome Steel Works.....	18	Eddy Electric Mfg. Co.....	32	Holmes & Edwards Silver Co.....	66
Berger Bros.....	74	Church, Isaac.....	90	Ellwood Shafting & Tube Co.....	16	Hooker-Colville Steam Pump Co.....	49
Berlin Iron Bridge Co.....	11	Cincinnati Corrugating Co.....	14	Enterprise Mfg. Co. of Pa.....	75	Houston, C. B. & Co.....	16
Best, Fox & Co.....	3	Claffen Mfg. Co.....	35	Erie Engine Works.....	32	Howard Iron Works.....	72
Bethlehem Iron Co.....	21	Clapp, Geo. M.....	49	Estey, W. S.....	6	Howard & Morse.....	7
Bevin Bros. Mfg. Co.....	68	Clark, G. P.....	87	Ette & Henger Mfg. Co.....	87	Howson & Howson.....	6
Bickford Drill & Tool Co.....	44	Clark & Cowles.....	4	Etting, Edw. J.....	16	Hudson, C. E. & Co.....	67
Bicycle Step Ladder Co.....	72	Clarke, Thomas.....	73	Eureka Cast Steel Co.....	98	Hulbut-Rogers Mch. Co.....	53
Bigelow, C. R.....	49	Clement & Dunbar.....	57	Evans-Friction Cone Co.....	3	Hurley Bros.....	63
Biggall & Keeler Mfg. Co.....	38	Clendenin Bros.....	13	Eynon-Evans Mfg. Co.....	29	Ideal Machine Works.....	46
Billings & Spencer Co.....	84	Cleveland Block Co.....	79	F. & N. Mfg. Co.....	88	Ideal Mfg. Co.....	68
Bingham, W. Co.....	68	Cleveland City Forge & Iron Co.....	1	Fairmount Machine Co.....	45	Illinois Central R. R.....	50
Birmingham Iron Foundry.....	22	Cleveland Fence Co.....	9	Fay, J. A. & Co.....	44	Illinois Pure Aluminum Co.....	72
Bishop, A. W.....	71	Cleveland Rubber Works.....	71	Fearing, Wm. S.....	2	Indiana Wire Fence Co.....	7
Bissell, E. Son & Co.....	51	Cleveland Stamping & Tool Co.....	72	Field, Alfred & Co.....	64	Ives, H. B. & Co.....	85
Blair Mfg. Co.....	89	Cleveland Stone Co.....	46	Fitch, W. & E. T.....	97	Jacobus, W. H.....	90
Blake & Johnson.....	13	Cleveland Twist Drill Co.....	43	Fitchburg Machine Works.....	34	Jarecki Mfg. Co.....	40
Bliss Co., E. W.....	36	Clinton Wire Cloth Co.....	8	Fitzsimons & Co.....	16	Jeffrey Mfg. Co.....	34
Boardman, L. & Son.....	65	Cobb & Drew.....	6	Flagg, Stanley G. & Co.....	98	Jenkins Bros.....	1
Boker, Hermann & Co.....	17	Coburn Trolley Track Mfg. Co.....	77	Foos Mfg. Co.....	46	Jenkins & Lingle.....	37
Bond Nail Co.....	13	Coes, Loring & Co.....	85	Fraim, E. T.....	78	Jenner, H. W. T.....	6
Boone, W. C. Mfg. Co.....	23	Coes Wrench Co.....	85	Frankford Steel Co.....	18	Jessop, Wm. & Sons.....	17
Booth, The Lloyd Co.....	24	Coffin & Leighton.....	40	Franklin, H. H. Mfg. Co.....	49	Johns, H. W. Mfg. Co.....	14
Borden & Lovell.....	8	Colburn, A. M.....	41	Frasse Co.....	57	Johnson, I. H., Jr., & Co.....	44
Borgner, Cyrus.....	24	Colby Wringer Co.....	74	Frost Thill Spring Co.....	83	Johnson, S. C.....	73
Boston Gear Works.....	32	Coldwell Lawn Mower Co.....	87	Fulton Iron & Engine Works.....	44	Jones, B. M. & Co.....	21
Bourke Mfg. Co.....	67	Conroy, P. J. & Co.....	83	Gardner, Jas. & Son.....	24	Jones & Lamson Machine Co.....	54
Box, Alfred & Co.....	45	Continental Gun Works.....	28	Garrison, A., Foundry Co.....	24	Jones & Jesse & Co.....	60
Boyce Rivet Co.....	98	Corbin, P. & F.....	77	Garry Iron & Steel Rfg. Co.....	21	Kanneberg Roofing Co.....	9
Bradlee & Co.....	15	Corning, Edw. & Co.....	15	Gartland Foundry Co.....	10	Kayser, Ellison & Co.....	17
Brass Goods Mfg. Co.....	2	Correspondence School of Mechanics.....	55	Garvin Machine Co.....	49	Keeley, Jerome & Co.....	16
Bridgeport Gun Implement Co.....	64	Cotton, Barclay W. & Co.....	15	Gautier Steel Department.....	14	Kelley & McBean.....	68
Bridgeport Mch. Tool Works.....	47	Covert Mfg. Co.....	81	Gaylord, F. L. Co.....	3	Kennedy, Julian.....	26
Briggs, Marvin.....	40	Covert's Saddlery Works.....	55	Gibbs Mfg. Co.....	87	Keuffel & Esser Co.....	59
Bristol Co.....	1	Cox, Justice, Jr.....	16	Gilbert & Bennett Mfg. Co.....	9	Keys, W. W. & R. M. Co.....	3
Britton, J. Blodgett.....	27	Cramp, Wm. & Sons S. & E. B. Co.....	3	Glazier Stove Co.....	55	Keystone Clutch & Machine Works.....	41
Britton, Horace E.....	64	Crescent Horse Shoe & Iron Co.....	83	Goddard, Asa.....	43	Kilbourne & Jacobs Mfg. Co.....	86
Broderick & Bascom Rope Co.....	6	Crescent Phosphorized Metal Co.....	3	Goodell Co.....	66	Kilmer Mfg. Co.....	7
Bromwell Brush & Wire Goods Co.....	10½	Cresson, Geo. V. Co.....	42	Gould & Eberhardt.....	31	King & Andrews.....	53
Bronson Supply Co.....	74	Croissant, M.....	73	Graham, John H. & Co.....	70	King, J. M. & Co.....	63
Brown, E. E. & Co.....	79	Crosby, G. A. & Co.....	37	Grand Crossing Tack Co.....	10	Knapp & Cowles Mfg. Co.....	74
Brown Hoisting & Conveying Mch. Co.....	34			Grand Rapids Cycle Co.....	68	Kohler, F. F. & Co.....	87
Brown, R. H. & Co.....	56			Green, A. H.....	76		
Bryan Mfg. Co.....	81						
Bryden Horse Shoe Co.....	81						
Buck Bros.....	65						

Kreischer, B. & Sons.....	24	New Haven Mfg Co.....	38	Ripley Mfg. Co.....	78	Tablet & Ticket Co.....	53
Krogsrud, W.....	60	New Haven Wire Mfg. Co.....	6	Riverside Iron Works.....	19	Talcott, W. O.....	35
La Belle Steel Co.....	20	N. J. Wire Cloth Co.....	8	Roberts, A. & P. & Co.....	18	Taunton Locomotive Mfg. Co.....	29
Lafin & Rand Powder Co.....	22	New Process Twist Drill Co.....	43	Roberts Mfg. Co.....	34	Taunton Wire Nail Co.....	7
Lake, J. H. & D. Co.....	41	Newton & Shipman.....	17	Robertson, E. C.....	53	Thomson, W. H. & Co.....	16
Lane Brothers.....	78	N. Y. Belting & Packing Co.....	35	Robinson-Rea Mfg. Co.....	23	Tiebout, W. & J.....	79
Lansing Wheelbarrow Co.....	87	N. Y. Gas Saving Co.....	53	Rogers, The Wm. Mfg. Co.....	66	Tilchman's Pat. Sand Blast Co., Ltd.	26
Laughlin, Alex. & Co.....	26	N. Y. Mallet & Handle Works.....	59	Rollason Gas Engines.....	32	Titchener, E. H. & Co.....	7
Lea, J. Tatnall & Co.....	20	N. Y. Powder Co.....	22	Rome Brass & Copper Co.....	2	Tod, Wm. & Co.....	28
Lean, D. R. Co.....	27	N. Y. Iron Roofing & Corrugating Co.	10	Rowland, Wm. & Harvey.....	98	Toledo Metal Wheel Co.....	68
League Cycle Co.....	97	Nicholson File Co.....	63	Russell, Burdall & Ward.....	98	Toomey, Frank.....	49
Le Count, C. W.....	83	Nicolls, Wheeler & Co.....	15	Russla Cement Co.....	57	Topliff & Ely Co.....	58
Leechburg Foundry & Machine Co.....	22	Niles Tool Works.....	15	St. Louis Bronze & Aluminum Works	3	Torrey, J. R. Razor Co.....	65
Leng's, Jno. S. Son & Co.....	98	North Bros. Mfg Co.....	18 & 55	Sabin Machine Co.....	4	Totten & Hogg Iron and Steel Fdry.	
Leonard, B. E.....	85	Northampton Cutlery Co.....	66	Salem Wire Nail Co.....	13	Co.....	22
Leonard, J.....	21	Northampton Emery Wheel Co.....	46	Samson Cordage Works.....	1	Townsend, W. P. & Co.....	90
Leschen, A. & Sons Rope Co.....	6	Norton Bros.....	79	Samuel, Frank.....	15	Trenton Iron Co.....	4
Levis, Henry & Co.....	21	Norton Emery Wheel Co.....	46	Saunders's Sons, D.....	39	Trethewey Mfg. Co.....	26
Lidgerwood Mfg. Co.....	98	Norton & Jones Machine Tool Works.	41	Sawyer, O. C.....	86	Trimont Mfg. Co.....	84
Lindsay, Jas. G. & Co.....	16	Norwalk Iron Works Co.....	33	Scattergood, H. W.....	46	Tyler Wire Works Co. W. S.....	54
Link-Belt Engineering Co.....	37	Nubian Iron Enamel Co.....	32	Scheeler & Sons.....	5	Union Lock & Hdw. Co., Ltd.....	21
Lockhart Iron & Steel Co.....	20	Obermayer, S. Co.....	19	Schneider & Trenkamp Co.....	71	Union Mfg. Co.....	42
Lovell, Jno. P. Arms Co.....	68	Ogden & Wallace.....	21	Schultze Mfg. Co.....	78	Union Metallic Cartridge Co.....	1
Lovegrove & Co.....	49	Old Dominion Iron & Nail Works Co.	83	Scott, Geo. M.....	34	U. S. Projectile Co.....	39
Loyd, John.....	76	Ossawan Mills Co.....	97	Seoville Mfg. Co.....	2	Valentine, M. D. & Bro.....	24
Ludlow-Saylor Wire Co.....	7	Ostrander Fire Brick Co.....	24	Seranton & Co.....	37	Valley Pump Works.....	33
Lufkin Rule Co.....	72	Ostrander, W. R. & Co.....	59	Seranton Forging Co.....	31	Valley Steel Co.....	1
Lukens Iron & Steel Co.....	15	Otto Gas Engine Works.....	30	Seranton Supply & Machine Co.....	43	Van Dorn Iron Works Co.....	7
Lundberg, Gustaf.....	17	Oxford Iron & Nail Co.....	13	Seaman, Sleeth & Black.....	22	Van Wagoner & Williams Co.....	98
Lunkenheimer Co.....	32	Packer, C. W.....	53	Sebastian Lathe Co.....	50	Victor Mfg. Co.....	79
McCabe, J. J.....	43	Palmer & De Mooy.....	23	Sellers, Wm. & Co.....	45	Vulcan Iron Works.....	33
McCaffrey File Co.....	63	Palmer Hardware Mfg. Co.....	56	Seneca Falls Mfg. Co.....	44 & 60	Walbridge & Co.....	71
McClure, Amster & Co.....	27	Pancoast Henry B. & Co.....	40	Sessions Foundry Co.....	23	Wallace Wm. H. & Co.....	21
McCoy, Jos. F. & Co.....	39	Passaic Rolling Mill Co.....	21	Seyfert's Sons, L. F.....	43	Walworth Mfg. Co.....	97
McFarland, Wm.....	4	Peabody & Parks.....	74	Shipley, A. B. & Son.....	65	Wardlow, S. & Co.....	17
McGowan, J. H. & Co.....	33 & 76	Peck, A. G. & Co.....	98	Shoenberger & Co.....	80	Washburn & Moen Mfg. Co.....	4
Mellvain, Wm. & Sons.....	27	Pennsylvania Bolt & Nut Co.....	89	Shultz Belting Co.....	1	Waterbury Brass Co.....	2
McKay, Jas. & Co.....	16	Penna. Diamond Drill & Mfg. Co.....	24	Sickels, Sweet & Lyon.....	75	Waterbury Farrel Foundry & Ma-	
McKinney Mfg. Co.....	77	Pennsylvania Mch. Co.....	48	Sidney Steel Scraper Co.....	87	chine Co.....	33
McKinnon Dash & Hdw. Co.....	76	Perry, W. H. & Co.....	48	Sigourney Tool Co.....	40	Waterbury Machine Co.....	42
McLean, John.....	38	Perry & Whipple Co.....	79	"Silver Finish".....	5	Watson & Stillman.....	39
McLeod & Henry Co.....	24	Philadelphia Drop Forge Co.....	24	Silver Mfg. Co.....	86	Webster, Warren & Co.....	30
McNab & Harlin Mfg. Co.....	28	Philadelphia Engineering Wks.....	27	Simonds Mfg. Co.....	60	Wellman Iron & Steel Co.....	15
Machinists' Supply Co.....	49	Philadelphia Lawn Mower Co.....	39	Singer, Nimick & Co.....	20	Wells Bros. & Co.....	42
Mackey, James T.....	2	Phillips, A. J. & Co.....	57, 67, 70, 76, 83 & 87	Smith & Egge Mfg. Co.....	42	Western Foundry Co.....	24
Mahoning Valley Iron Co.....	21	Phillips, Townsend & Co.....	13	Smith, H. D. & Co.....	83	Wetherell Bros.....	16 & 20
Main Belting Co.....	35	Phoenix Horseshoe Co.....	27	Smith, J. D. Foundry Supply Co.....	23	Wetherhill, Robt. & Co.....	97
Manning, Maxwell & Moore.....	43	Phoenix Iron Co.....	15	Smythe, S. R. Co., Inc.....	26	Wharton, J. S. Lovering.....	57
Manville Machine Co., E. J.....	47	Phosphor Bronze Smelting Co.....	3	Solomon, Jno. M.....	23	White, A. A. & Co.....	60
Mansfield, H. H.....	49	Pierson & Co.....	18	Sommer's Son, John.....	98	White, L. & I. J. Co.....	65
Maris & Beekley.....	45	Pike Mfg. Co.....	58	Southwark Foundry & Machine Co..	32	White Mt. Freezer Co.....	55
Maslin, J. & Son.....	33	Pilling & Crane.....	16	Speidel, J. G.....	45	White, Van Gahn & Co.....	64
Mast, Foss & Co.....	69	Pittsburgh I. & S. Eng. Co.....	27	Spencer's I. S. Sons.....	24	Whitlock Coil Pipe Co.....	30
Matthlessen & Hegeler Zinc Co.....	2	Pittsburgh Mfg. Co.....	34	Standard Fdry. & Mfg. Co.....	22	Whitney, A. R. & Co.....	18
Maurer, H. & Son.....	24	Pittsburgh Reduction Co.....	54	Standard Horse Shoe Co.....	81	Whitton, D. E. Mch. Co.....	41
Mayhew, H. H. Co.....	65	Place, Geo.....	43	Standard Lighting Co.....	70	Wickes Bros.....	61
Merrill Bros.....	26	Plumb, Fayette R.....	67	Standard Steel Casting Co.....	98	Wickwire Bros.....	7
Merrill Mfg. Co.....	39	Plume & Atwood Mfg. Co.....	2 & 75	Standard Tool Co.....	43	Wilcox & Howe Co.....	79
Miles, F. S.....	4	Pollock, W. B. & Co.....	28	Stanley Rule & Level Co.....	97	Wiley & Russell Mfg. Co.....	40 & 98
Miller & Van Winkle.....	4	Poole, Robt. & Son Co.....	51	Stanley Works.....	78	Williams, J. H. & Co.....	84
Millers Falls Co.....	56 & 58	Pope Mfg. Co.....	55	Star Mfg. Co.....	85	Wilkinson, A. J. & Co.....	59
Milne, A. & Co.....	18	Poppling, J.....	46	Stark Mch. & Tool Co.....	37	Williamson, C. T. Wire Nov. Co.....	97
Milton Mfg. Co.....	89	Port Chester Bolt & Nut Co.....	90	Starrett, L. S.....	69	Williamsport Wire Rope Co.....	6
Miner & Peck Mfg. Co.....	38	Portland Lawn Sprinkler Co.....	87	Steam Gauge & Lantern Co.....	74	Wilnot & Hobbs Mfg. Co.....	1 & 9
Missouri Metal Co.....	2	Pottstown Iron Co.....	18	Stearns, E. C. & Co.....	64 & 78	Wilson, E. H. & Co.....	18
Mohr, J. J.....	16	Pottsville Iron & Steel Co.....	15	Steel & Iron Improvement Co.....	54	Wilson, John.....	64
Monarch Cycle Co.....	69	Powell Planer Co.....	49	Steptoe, J. & Co.....	50	Wilson, J. Fred.....	89
Monce, S. G.....	72	Pratt & Cady Co.....	97	Sterling Cycle Works.....	63	Wilson, W. A.....	38
Montour Iron & Steel Co.....	21	Pratt & Whitney Co.....	42	Sternbergh, J. H. & Son.....	90	Winslow, Sam'l. Skate Mfg. Co.....	67
Moore, Dr. Gideon E.....	54	Prentiss Tool & Supply Co.....	18	Stevens Arms & Tool Co.....	72	Wister, Francis.....	16
Moore Mfg. & Foundry Co.....	45	Prentiss Vise Co.....	58	Steward & Romaine Mfg. Co., Ltd...	89	Wister, L. & R. & Co.....	21
Moore & White Co.....	42	Pullman Sash Balance Co.....	64	Stiles & Parker Press Co.....	36	Wolcott & West.....	53
Moorhead-McCleane Co.....	20	Putnam Nail Co.....	82	Stirling Co.....	30	Wolff, R. H. & Co. Ltd.....	5
Morgan Construction Co.....	4	Quint, A. D.....	39	Stocking, E. B.....	6	Wollensak, J. F.....	58, 60 & 79
Morgan Spring Co.....	4	Rainey, W. J.....	1	Storm Mfg. Co.....	68	Wood Alan & Co.....	16
Morrison, Robert.....	32	Rand Drill Co.....	31	Storm Mfg. Co.....	53	Wood, R. D. & Co.....	23
Morse Twist Drill & Machine Co.....	43	Randolph & Clowes.....	1	Stover Mfg. Co.....	78	Wood, W. Dewees Co.....	20
Morse, Williams & Co.....	45	Read, Wm. & Sons.....	97	Stow Flexible Shaft Co.....	43	Worcester Mch. Screw Co.....	90
Morton, Thos.....	84	Reading Hardware Co.....	78	Stow Mfg. Co.....	43	Worthington, Henry R.....	33
Moseley Iron Bridge & Roof Co.....	13	Reece, Edw. F.....	41	Stuart & Peterson Co.....	56	Wright & Colton Wire Cloth Co.....	8
Mount Carmel Bolt Co.....	97	Reeves, Paul S.....	98	Sturtevant, B. F. Co.....	38	Wurster, F. W. & Co.....	98
Myers, F. E. & Bro.....	58	Reynolds & Co.....	10	Sturtevant Mfg. Co.....	46	Wyman & Gordon.....	84
National Horse Nail Co.....	83	R. I. Perkins Horse Shoe Co.....	81	Superior Steel Co.....	5	Yale & Towne Mfg. Co.....	44 & 57
National Pipe Bending Co.....	29	Rhodes, L. E. Co.....	46	Supplier Hardware Co.....	88		
National Saw Co.....	60	Richardson, C. F. & Son.....	60	Sweetser, W. A.....	21		
National Wringer Co.....	74	Richards, I. P.....	97	Swindell, W. & Bros.....	26		
Newark Machine Tool Works.....	54	Richmond Cedar Works.....	75	Talntor Mfg. Co.....	60		
New Castle Wire Nail Co.....	13	Ridgway, Craig & Son.....	44				
New Haven Copper Co.....	2	Riehlé Bro Testing Machine Co.....	36				

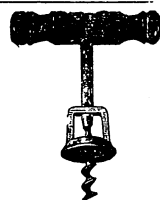
Published by DAVID WILLIAMS, 96-102
 Reade Street, New York. Printed by
 THE WILLIAMS PRINTING CO., Gen-
 eral Book, Commercial and News-
 paper Printers and Binders, 96-102
 Reade St., New York.



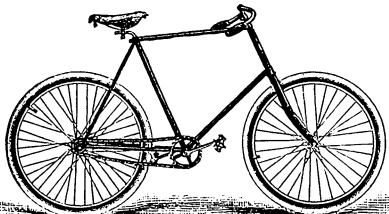
WHEN IN NEED Address **MOUNT CARMEL BOLT CO.,**
MOUNT CARMEL, CONN.

DIRECTIONS FOR USING
WILLIAMSON'S NEW POWER CORK SCREWS.
KEEP ON TURNING, DO NOT PULL.

No. 1243, Nickel Plated, Apple Wood Handle, \$5.00 per dozen.
1443, Rosewood 5.50
For Discounts and Prices of other styles send for Catalogue.
C. T. WILLIAMSON WIRE NOVELTY CO., NEWARK, N. J.
Manufacturers of Wire Specialties for the Trade.



OUR AGENTS MAKE MONEY.

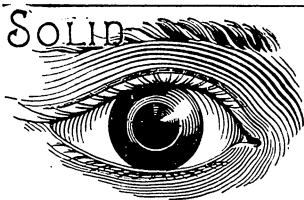


We Make
Wheels to Sell and
Stay Sold.

THE EAGLE BICYCLE MFG. CO.,
TORRINGTON, CONN.

FIRST AND ONLY
IN THE WORLD TO MAKE

ALUMINUM RIMS AND CLINCHER TIRES.

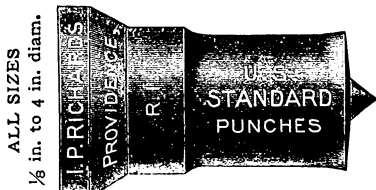


THE PRATT & CADY CO.,
HARTFORD, CONN.

Sash Weights.

WILLIAM A. HARRIS, Selling Agent.

The "DODD'S" LIQUID CLUE.
It gives Perfect Satisfaction.
Best. A. W. DODD & CO., Gloucester, Mass.



For Punching
IRON AND STEEL.

Mechanics.—The Technical Student's Introduction to. Being a series of Practical Papers showing the leading Principles of Physical Science, Exemplified in the Properties of Bodies or Materials; the laws which Regulate the Phenomena of Motion, of Heat, of the Atmosphere, of Water at Rest and in Motion, etc., etc., as applied to the Practical Work of the Architect and Builder, the Engineer and Machinist, and the General Artisan engaged in the Designing and Construction of Machines, Tools, and Appliances Useful in the Industrial Arts. By Various Writers. Edited by Robert Scott Burn. About 150 Illustrations, \$2.00
For sale by David Williams, 96-102 Reade St., N. Y.

BOOKS. YOU CAN OBTAIN PROMPTLY the latest work on any subject in which you are interested by addressing **DAVID WILLIAMS, Publisher and bookseller, 96-102 Reade St., New York**

WALWORTH MFG. CO., - Boston, Mass.,

MANUFACTURERS OF

Tools for cutting and threading **Wrought Iron Pipe,**
DIE PLATES AND DIES,

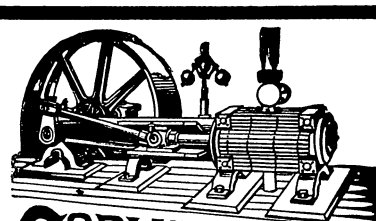
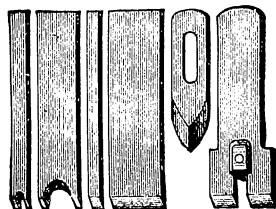
STILLSON PIPE WRENCH, Miller's Ratchet Die Plate, Brass and Iron Valves and Cocks, Wrought Iron Pipe and General Machinists' Supplies.

STANLEY'S ADJUSTABLE

Beading, Rabbet, Slitting and Matching Plane.

No. 45. Iron Stock and Fence, with Eighteen Tools, Bits, etc., \$8.00

Sold by all Hardware Dealers.



CORLISS ENGINES
MACHINISTS
IRON FOUNDERS, BOILER MAKERS,
ROBT. WETHERILL & CO.
CHESTER, PA.

Look ! Look !!

1894 MODEL BICYCLES

FOR HARDWARE TRADE.



New 1894 Model **NEW MAIL.** Highest Grade, 10 years' reputation. Also **BEST LINE** cheap and medium grade wheels in the market. Address

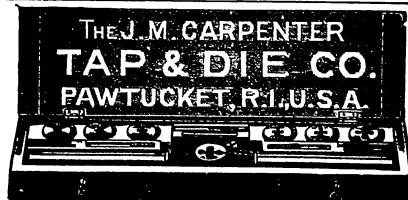
WM. READ & SONS,
107 WASHINGTON ST., - **BOSTON.**
ESTABLISHED 1826.

MUST SECURE AGENCY NOW !!!



CROWN and GIANT BRAIDED
Sash Cords, Bell Cords, Mason's Lines, Clothes Lines, Bright Wire Goods, Picture Wire Nails, Knobs and Hooks, Brass Chain, Spool Wire, Etc.

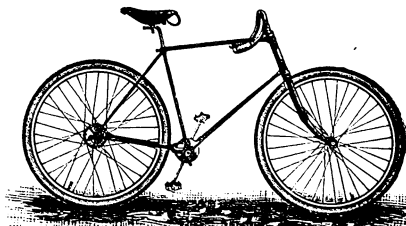
OSSAWAN MILLS CO.,
Norwich, Conn., U. S. A.



THE J. M. CARPENTER
TAP & DIE CO.
PAWTUCKET, R.I. U.S.A.

SECURE AGENCY NOW.

The League Chainless Safety
MARKS A NEW ERA.



—SEND FOR CATALOGUE.—

THE LEAGUE CYCLE COMPANY,
Hartford, Ct.



THE W. & E. T. FITCH CO.,
NEW HAVEN, CONN.
Manufacturers of a variety of
HARNES SNAPS.

This Out represents the
UNION PAT. BOLT SNAP.

PAUL S. REEVES,
Philadelphia.
Phosphor Bronze
AND
BABBITT METALS.
Lead Lined Car Bearings a Specialty.

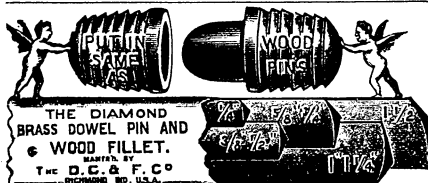
Brass and Phosphor Bronze Castings from $\frac{1}{4}$ pound to 20,000 pounds in weight.

STANDARD STEEL CASTING CO.
THURLOW, PA.
STEEL CASTINGS
QUALITY EQUAL TO STEEL FORGINGS

BURGESS & LOXLEY,
Malleable Iron and Small Steel Castings.

MILITARY ROAD & CHANDLER STREET,
BUFFALO, N. Y.

NORWAY IRON RIVETS.
FOR ALL PURPOSES.
WRITE FOR PRICES TO
THE BOYCE RIVET CO.
MUNCIE, INDIANA.



STEEL TUBES
WELDLESS
JOHN S. LENG'S SON & CO. NEW YORK.

DAYTON
MALLEABLE
IRON CO.
DAYTON, O.
HIGH CLASS
CASTINGS A SPECIALTY.

BUFFALO FORGES.
AMERICA'S BEST.
THE WORLD'S STANDARD.
BUFFALO FORGE CO.
BUFFALO, N.Y. U.S.A.

BUFFALO DRILLS.
FOR BLACKSMITH,
CARRIAGE & WAGON MANFRS.
24 SIZES.
BUFFALO FORGE CO.
BUFFALO, N.Y. U.S.A.

STANLEY G. FLAGG & CO., Philadelphia, Pa.
Office and Works, N. W. Cor. 19th St. & Pennsylvania Ave.
Manufacturers of **STEEL CASTINGS,**
A Substitute for Steel and Wrought Forgings.
Circulars Sent on Application.

ROLLER JACK SCREW.

See Page 56.

MILLERS FALLS CO.,
93 Reade St., New York.

EUREKA CAST STEEL COMPANY.
Office and Works, Chester, Pa.
Open Hearth, Crucible and Eureka Steel Castings.
Railroad and Machine Castings.
Locomotive Cross-Heads and Gearing a Specialty.
Guaranteed Knuckles for M. C. B. Couplers.

SPRINGS AND AXLES
ROLLING MILL.
F. W. WURSTER & CO.
375 Kent Ave. Brooklyn N.Y.

New Full Mounted
Lightning Screw
Plate.
Send for Catalogue



WILEY & RUSSELL MFG. CO., - Greenfield, Mass.

LIDGERWOOD
HOISTING ENGINES.

370 styles and sizes. Over 10,000 in use.

LIDGERWOOD MFG. CO., 96 Liberty St., N. Y.

ESTABLISHED

Spring Making, 1842. Steel Making, 1845.
Norway Iron, 1871 (Re-Rolled).

WM. & HARVEY ROWLAND,
MANUFACTURERS OF
Springs, Steel, Re-Rolled Norway
Iron & Slit Norway Nail Rods.

Address FRANKFORD P. O., PHILADELPHIA.



A. G. PECK & CO.
Cohoes, N. Y.
MANUFACTURERS OF
AXES, ADZES,
BROAD AXES,
HATCHETS.

Send for Catalogue
and Price List.

THIS IS THE TIME TO BUY
Lemon Squeezers.

WRITE FOR PRICES TO

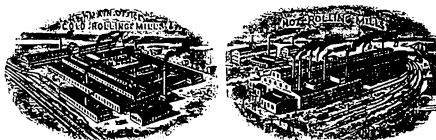
JOHN SOMMER'S SON,

355-365 Central Ave., - Newark, N. J.

RUSSELL, BURDSALL & WARD,
Portchester, N. Y.,
Manufacturers of
Carriage, Tire, Plow and Stove
BOLTS

Carriage Bolts made from Best Square Iron a Specialty.

The Wilmot & Hobbs Mfg. Co.,
MAIN OFFICE, MILLS AND FACTORIES AT
BRIDGEPORT, CONN.
STORE, 20 MURRAY ST., NEW YORK.
(CONNECTED BY TELEPHONE.)



BESSEMER, OPEN HEARTH,
and the Celebrated and Unequaled
"SWEDOH"
(REGISTERED TRADE-MARK.)

Sheet, Band and Strip Steel

HOT ROLLED in lots of a few tons or more of a size, and in widths varying from one inch to eight inches or thereabouts by about 1-16 inch and in thickness No. 21 Stubb's Gauge (about 1-32 inch) and thicker for the narrower widths and proportionally thin for the wider sizes, and with plain blue, annealed or pickled finishes.

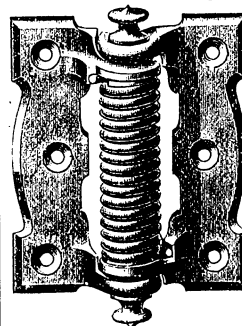
COLD ROLLED Especially to order in lots of a ton or more of a size, with round edges in any of the regular Hot Rolled Steel stock widths up to 15 inches (other widths furnished at our option with round edges or one or two sheared edges; unless ordered differently), and in thickness No. 33 Stubb's Gauge (less than 1-100 inch) and thicker depending upon the width, up to about No. 6 Stubb's Gauge (about 2-10 inch) and with any quality of surface or degree of stiffness or ductility, as follows:

Tabulated Code of Initials used in describing degree of Smoothness of Surface and Ductility of Cold Rolled Steel.

For more complete description of any one of these qualities of finish send for our new Steel Department Pamphlet.	"EXTRA SOFT" DRAWING STEEL.	"SOFT" DRAWING STEEL.	"HALF HARD" DRAWING STEEL.	"HARD" DRAWING STEEL.	"EXTRA HARD" BRIGHT STEEL.
"Fairly Smooth" Surface.	A. F.	B. F.	C. F.	D. F.	NONE MADE.
"Good Smooth" Surface.	A. G.	B. G.	C. G.	D. G.	E. G.
"Best Smooth" Surface.	A. B.	B. B.	C. B.	D. B.	E. B.

Used for all Pressed, Stamped and Drawn Work. Easily Brass, Copper, Bronze or Nickel Plated, Tinned or Japanned.

Columbia Spring Hinges



FOR
Screen Doors.

Cast Iron,
Japanned.

These Hinges are very simple in construction. They are packed flat, with the tension of the Springs adjusted, and are "ready for business" as soon as attached to the door.

Having no small or loose parts, they cannot get out of order. They are reversible and can be used on either Right or Left Hand Doors.

No. 14, 3 x 2 1/2, Japanned.
1 Dozen pairs in a box. 1/2 Gross pairs in a case.
THE CHEAPEST AND BEST SPRINGS IN THE MARKET. SEND FOR PRICES.

MANUFACTURED BY
VAN WAGONER & WILLIAMS CO.,
Cleveland, Ohio, and 14 Warren Street, New York.

THE IRON AGE

THURSDAY, MARCH 29, 1894.

Iron and Steel in Shipbuilding.

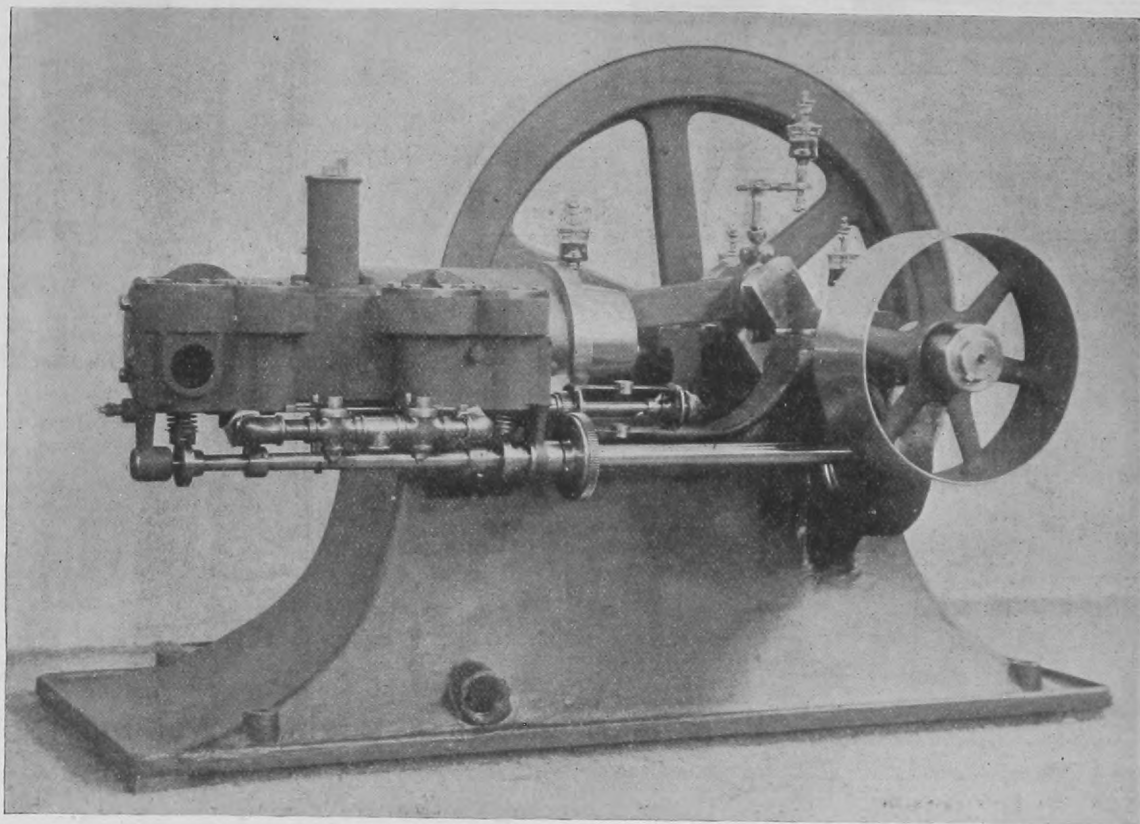
It would appear that the advance in the use of steel for shipbuilding in England has continued during the last few months of dullness, and now there is in the returns an almost exclusive use of steel by some of the largest users. For instance, of the three firms which stood at the head of the builders for last year, the return shows that out of 60 vessels built in the yards of these firms, steam and sailing, every one is recorded as built of steel. The tonnage so returned was over 162,000 tons, so that it

ance during the life of the vessel. The cheapness of steel may be a danger, for it is evident, says the *Engineer*, that the price is now so low that there can be very little profit to the manufacturers, except where the production is enormous; and the limited profit is found too often to point to attempts either to use an undue proportion of too cheap material, or what is even worse, to lessen the amount of the work that is put into the metal. There is now so large a fleet of merchant vessels built of steel that a complete test is being afforded of its power not only of standing stress and strains of all kinds, but also

The Wattles Gas Engine.

The Wattles gas engine is single acting and in it an impulse is secured at every revolution of the crank shaft. Its distinctive features are the two concentric cylinders adjacent to but independent of each other and a differential piston combined with separate inlet and exhaust valves for each cylinder.

Fig. 2 of the accompanying drawings is a horizontal section of the engine on the center line of the cylinders; Figs. 3 and 5 are end views; Fig. 4 is a side elevation; Fig. 6 is a side view of the dif



THE WATTLES GAS ENGINE.

would seem that there was thus accounted for nearly one-fifth of the total output of the kingdom; and if the next two or three builders on the list are taken it will be found that the result is the same; and it is found, indeed, that many ports have exclusively used that material. But at the same time a few vessels of moderate size continue to be built of iron; and it is certain that there are still some shipowners who believe that corrosion is most marked in the case of steel steamers, and that for some trades a liberal use of iron in construction is essential. In one or two instances it may be believed that there are grounds for the opinion that at least in parts of steamers iron has its use, and will continue there to be preferred to steel. But we are gaining experience with the latter material daily, and we should be able soon to define the quality and temper of the metal that is best adapted for various uses, and especially for use in different parts of the vessels where there are varying tests of endur-

to endure the corrosive effect that the sea is found to have. There needs to be maintained that high quality of steel that was the boast of some of the early producers of the material; and with that it may be fairly expected that there will be a continuance of the substitution of steel for iron in shipbuilding generally, the exceptions possibly being those where ship yards are at such a distance from steel works that there is a natural tendency to the use of the older material.

W. A. Wetmore has been appointed Western sales agent of the Colorado Fuel & Iron Company, with office in the Morlan Block, Salt Lake City, Utah.

The annual report of William Jessop & Sons, Sheffield, England, shows a profit of £20,843, including a balance of £3109 at the beginning of the year.

ferential piston; Fig. 7 is a transverse section of the cylinder and one set of supply valves on the center line of the latter; Fig. 8 is a similar section on the center line of the corresponding exhaust valve, and Fig. 9 is a longitudinal vertical section through the center of all the valves and valve mechanism. Figs. 6 to 9 inclusive are drawn upon double the scale of the preceding figures.

The cylinders *a* and *b*, Fig. 2, are supported upon the bed *A* of the engine. They are so constructed that the area of the cylinder *a* is equal to the area of the cylinder *b*, after deducting the area of the piston *c*, and an impulse of equal intensity in both cylinders is thus insured on the operative faces *C*¹ and *C*² respectively of the differential piston, Fig. 6. Both cylinders are completely inclosed by the water jacket *j*.

The piston *c* is connected with the crank *d* by the single connecting rod *e*, pivoted upon the pin *e*¹. The crank shaft *D* carries at one end the fly wheel

F, and at the other end the pulley P for transmitting the power developed in the cylinders.

All the valves are of the poppet type and are self closing. The air valve *h*, Figs. 7 and 9, is opened by suction of the piston only. The exhaust valve is shown by I, Fig. 9. These valves have wing guides to direct them to their seats. The gas valves *g*, Figs. 7 and 9, have stems, *g*², guided by suitable bearings, and projected through the lower side of the gas chamber to engage the valve mechanism.

The valve chests *f*, Fig. 4, are provided with removable caps *f*¹. Figs. 7 and 8, directly over the air and exhaust valves to make the latter accessible. Each valve chest is divided into three

cam *n* and lower end of the stem of the gas valve *g*. The shifter rod is coupled to or formed continuous with the spindle of a centrifugal governor, *s*, connected with the cam shaft by gears *s*¹, whereby the divergence of the governor balls forces the shifter rod backward from the same and disengages the levers or tappets *r*¹ from contact with the gas valve to supply the explosive mixture to the cylinders until the speed of the engine is reduced to normal rate.

The stem, Fig. 8, of the exhaust valve is provided upon its lower end with a collar, *q*, notched in its under side to receive the cam *o*, which bears upon a transverse pin, *q*¹, across the notch, in order to press the valve stem

9. The tubes are inclosed with a suitable heating burner within the chimney *t*², Fig. 3.

In the position of the piston indicated in Fig. 2 the explosion may be considered to have just occurred in the cylinder *a*, and the heated products of combustion thus exerting an impulse upon the face *c*¹ of the differential piston, driving it on its outward stroke. The other face, *c*², of the piston, by its movement at the same time, is drawing a mixture of gas and air through its respective valves into the cylinder *b*. The piston moves to the end of its stroke, and on its return stroke compresses the explosive mixture just drawn into the cylinder *b* (the supply valves having closed at the end of the outward stroke).

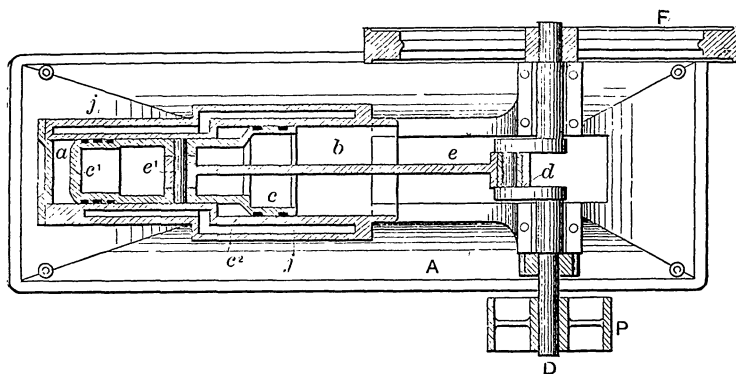


Fig. 2.—Sectional Plan through Cylinders.

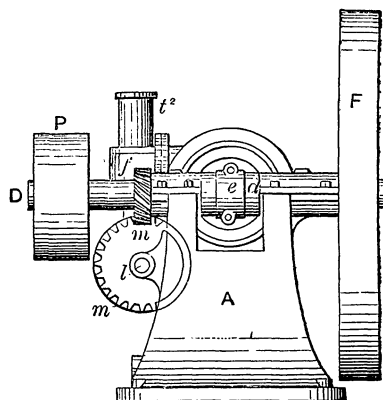


Fig. 3.—End Elevation.

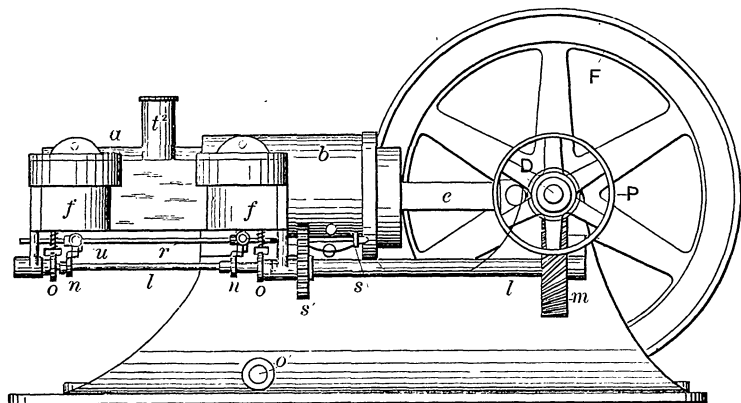


Fig. 4.—Side Elevation.

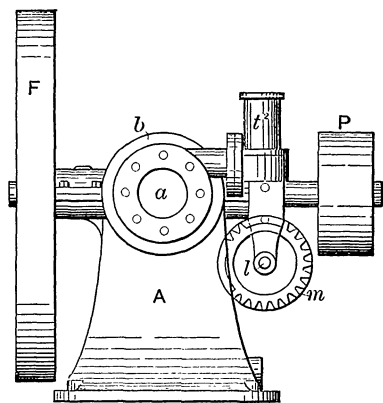


Fig. 5.—End Elevation.

THE WATTLES GAS ENGINE.

chambers. The top chamber M, Fig. 9, is connected with the cylinder by a port, M¹, which is always open. The second, or air, chamber communicates with the air apartment in the engine bed by a channel, N¹, Fig. 8. The third, or exhaust, chamber O communicates with the atmosphere by means of the channel O¹ in the bed A. In the valve chest in the air chamber N is the gas chamber *n*.

The valve operating mechanism comprises the cam shaft L, connected to the crank shaft by means of the spiral gears *m*, Fig. 5. They are suitably proportioned to operate the valve mechanism at one-half the speed of the crank shaft. Upon the shaft L are fixed the cams *n* and *o*, for actuating respectively the gas and exhaust valves. A shifter rod, *r*, is mounted parallel and adjacent to the cam shaft and carries the levers or tappets *r*¹ to engage the

upward at the required intervals to open the valve. The air valve requires no positive mechanism for opening it, as the suction of the piston in the cylinder from which the spent gases have been expelled is sufficient to admit the required amount of air through such valve. Both the gas and exhaust valves are provided with springs for seating them positively, but the air valve is closed merely by gravity.

The gas and exhaust valves for the cylinder *a* are actuated at the required instant in the cycle of the engine by setting their respective cams about 90° apart—the exhaust cam in advance of the gas cam—and the valves of cylinder *b* are actuated alternating with the valves on cylinder *a*.

The ignition is affected by the penetration of the explosive mixture from the mixing chamber M through the passage T into the heated tubes *t*¹, Fig.

The exhaust valve having opened upon the return of the piston in the cylinder *a*, the spent products of combustion are simultaneously driven therefrom. At the end of the return stroke the compressed mixture in the cylinder *b* is ignited, from which point the second half of the cycle is duplicated.

The power secured in this form of engine is claimed to be double that of that type of engine receiving an impulse every second revolution. The motion is more uniform and the heavier parts of the machine do not require to be duplicated as in the ordinary duplex engines. These advantages are secured without materially altering the weight or increasing the floor space required. The gas consumption per horse-power is no greater than that of other types of engines. This engine is built by the Wattles Gas Engine Company of 142 Broad street, Elizabeth, N. J.

The Waddell Lift Bridge.

The new lift bridge on South Halsted street, Chicago, the only one of its kind in the world, has been completed. For a long time opinion has been divided regarding this structure, which, because of its novelty, has been pronounced a failure, and many are those who have been proclaiming that it would be a useless expenditure of funds to complete it. It was inspected last week by a

was to rest when open. When Mr. Waddell's idea was suggested Commissioner Aldrich at once took it up and secured favorable action regarding it. The features of the new bridge are its speed in operation and the ease with which it is controlled. Two high towers on either bank of the river support large sheaves over which pass 32 steel cables, 1½ inches in diameter. In addition to these are eight cables on either side of the river to support the bridge proper, which weighs 300 tons.

feet, without obstruction. The bridge is operated by two engines of 10 horsepower each, which are supplied with steam from boilers situated under the approach at the north end of the bridge. It is elevated to its extreme height in 49 seconds

In regard to the question of economy in the case of compound locomotives, the *Railroad Gazette* says: "Two railroads that have been experimenting with compound locomotives for the past two years have reached the important conclusion that in freight service the compound locomotive, if reasonably well designed, will, without unusual care, effect a saving in fuel of fully 20 per cent. Most of the old prejudice against the compound mechanism is gone; it has been driven out by daily experience with the devices, accomplished in these two cases by shifting the compound from one division of the road to another, and finally leading to a recommendation to the management

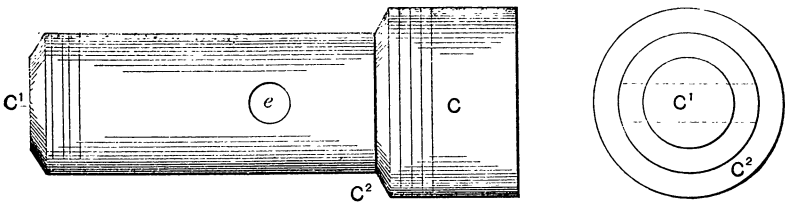


Fig. 6.—The Piston.

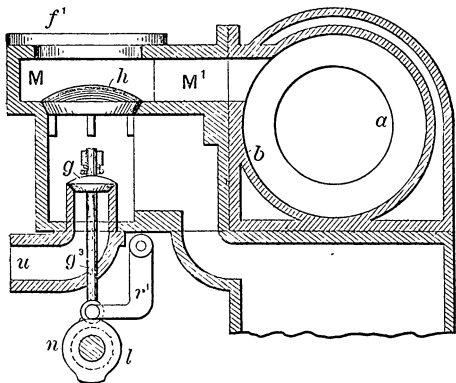


Fig. 7.—Transverse Section through Supply Valve.

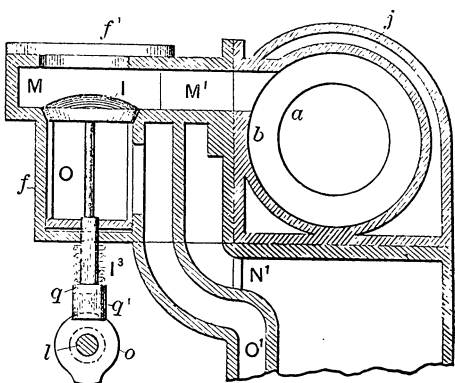


Fig. 8.—Transverse Section through Exhaust Valve.

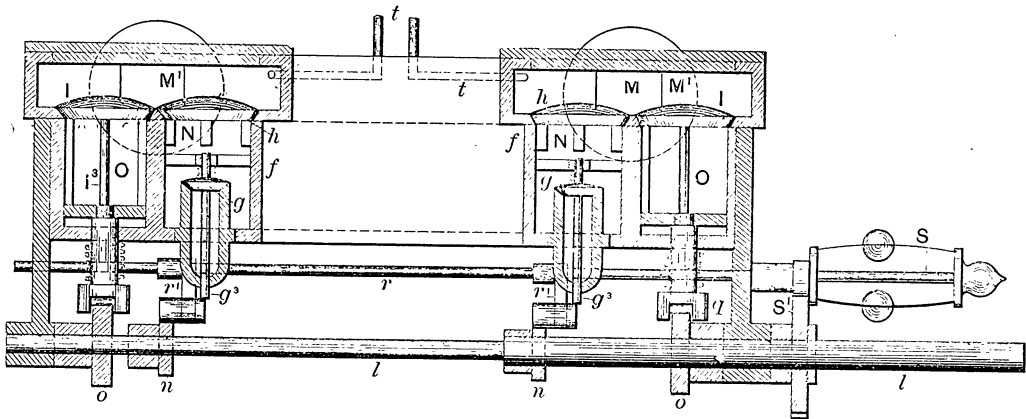


Fig. 9.—Longitudinal Vertical Section through Centers of all Valves and Valve Mechanism.

THE WATTLES GAS ENGINE.

party of city officials and engineers from all parts of the country, and pronounced a great success in every particular. The bridge, which is a decided innovation in engineering, was designed by J. L. A. Waddell, a Kansas City bridge engineer, whose plans were approved by the then Commissioner of Public Works Aldrich. Commissioner Aldrich was confronted by a difficulty when the United States forbade a swing bridge of the ordinary type across the river at Halsted street. It was claimed that the channel was too narrow to permit of a pier being erected in the center, upon which the bridge

Attached to the other end of the lift cables are four masses of iron or weights, aggregating in all 300 tons, or enough to just counterbalance the weight of the bridge. At the upper and lower extremities of the towers are placed huge hydraulic buffers, which act as guards against the possible breaking away of the bridge and also serve to lessen the shock of contact when the bridge is raised and lowered. These towers are 191 feet high from the level of the river, and when the bridge is lifted the clearance between its under side and the water is 155 feet. The waterway from bank to bank is 89

to consider the advisability of using compounds hereafter. Using 20 per cent. less fuel and water means less labor in several directions, and some considerable decrease in the cost of the repairs to the boilers." Radical changes were made last week in the Board of Directors of the New York and New England Railroad. At the annual meeting of the stockholders, McLeod and four other members of his board were dropped and entirely new blood was introduced. McLeod was also ousted from the presidency of the road.

Economy of Steam in Rolling Mill Engines.

A paper on economy of steam in rolling mill engines was recently presented before the Cleveland Institution of Engineers, England. The author called attention to the tremendous waste of steam in many existing engines, even in some which might be called new engines. Translating pounds of coal per horse-power into pounds of steam, as being more convenient for the purposes of his paper, he gave an illustration of one engine in which the steam consumption was about 800 pounds per horse-power per hour, and of a perfectly new rolling mill engine, in which it could not have been less than 64 pounds with fullest load, and with an average load would probably be about 80 pounds per horse-power per hour. The waste of steam in all engines was due to one or other of two causes—bad design or bad condition. He gave an instance of the loss of economy caused by the latter, and he mentioned that while the main engines in a rolling mill were, as a rule, fairly well looked after, many of the auxiliary engines were much neglected—indeed, if they would turn round at all they were mostly left alone. Such engines were using anything up to 690 pounds of steam per horse-power per hour, when (if of the right size for the work) with tight piston and well proportioned slide valve they would get along with 40 to 50 pounds. The condition of the auxiliary engines was hardly so unimportant a matter as was often considered. Often the pistons and slide valves of such engines were originally not as good as they might be. In dealing with the question of design, the author stated that the principal causes of excessive steam consumption in rolling mill engines were malproportion of the engine to the work to be done, too low a steam pressure and too little expansion. First, as to the size of the engine in relation to the work, too small an engine was a great evil, as it necessarily prevented any reasonable degree of expansion being used, and if so small as to be unable to do its work with reasonable speed might lead to losses in the mill, compared with which extravagant steam consumption would be insignificant, but as a means of insuring a wasteful use of steam there was nothing to compare with too large an engine—that was if, as was usual in rolling mill engines in the north of England, it was non-condensing. Unless such engines were loaded to a reasonable extent, the most carefully made pistons and elaborate expansion gear would fail to obtain even an approach to economy, while if the load were nearly right a tight piston and well-designed valve, without any expansion gear at all, would secure a very satisfactory result. The author cited practical evidence of this, which showed the absolute necessity of properly proportioning the engine to the load.

There were two difficulties of doing this—one was that the millowner or managers frequently settled the size of the engine without considering the engineer, simply asking quotations for an engine of a definite size, and the other difficulty was that very little was known as to what power it really took to roll iron or steel. To show the difficulty of ascertaining this, if the engine were provided with an enormous fly-wheel, it was easy enough to indicate the engine, but this gave little measure of the power actually employed in roll-

ing, as a very considerable proportion of the necessary power was probably being taken from that stored up in the fly wheel during the time the mill was running empty, and the power actually required for the rolling might be any amount greater than that indicated at the time. To get the correct power in the case of a reversing engine without a fly wheel was about as difficult, for no two consecutive strokes were at the same speed, and the driver was constantly varying the throttle valve, so that no two diagrams were alike. In spite of the difficulties, Mr. Worth believed that this was a matter which would amply repay investigation by any one contemplating putting down a new rolling mill engine, and in case of a mill rolling steel, or so much steel in proportion to iron that firing boilers were needed, it would pay and pay so well as to be one of the best possible investments to ascertain first what power was really required, and then put down engines adapted to give out that power with economy. The system appeared at present to be one of guesswork, and to prove this the author gave, in tabular form, particulars of the working of over a score of engines and mills in actual practice both in this country and America. These tables, he said, afforded a means of obtaining an approximation of what power was required in a mill. He might fairly conclude that the power required to roll about 100 tons per shift did not greatly exceed 1000 horse-power, and was not necessarily much more with a reversing engine than with a continuous running one.

He remembered a former manager of Bolckow, Vaughan & Co. stating that they had converted their engines at Witton Park from the old style to the reversing system, and that, contrary to expectation, they found less steam to be required. Certain of the engines cited were wasteful of steam from low pressure and little expansion, but certain others were wasteful because the power they could develop with economy was so enormously in excess of that really required to do the work; in fact, one of them was like a mountain bringing forth a mouse. With cogging mills it was about the same. One mentioned could get through 150 tons per shift (working pretty continually) with only 530 horse-power, while other two had one 3600 and the other 6000 horse-power provided to do about 180 tons, but these latter were only working six hours out of the 12, though even then they would have a lot of power in excess. It was certain that the owners of all the big engines cited had paid for power quite out of all reason in excess of their real requirements, and, if so, they were spending thousands of pounds a year in fuel which would not have been needed had engines of more suitable size and more economical construction been put down in the first instance.

The most important point to be secured in a rolling mill was efficiency—the engine must be able to do the heaviest work required, and to stand the rough usage and the strains incidental to such work without needing continual tinkering. It was, however, quite possible to obtain reasonable economy without sacrificing this efficiency in the least, and the author considered the means by which this might be done. There were three cases needing consideration: 1, That of older mills, originally put up for iron and converted to steel; 2, that of existing but more modern steel mills, many of which were very extravagant

in steam consumption; and 3, where an entirely new mill had to be put down, and the designer had, therefore, a free hand. With reference to the effect of pressure and expansion in economy, the author read a table giving an approximation of the probable steam consumption under different circumstances with simple non-condensing engines. In taking the case of a mill converted from iron to steel, he said that, in all probability, part iron would still be made, the old boilers retained with a pressure of 40 to 50 pounds, supplemented by hand fired boilers, and the engines would probably be of the fly wheel type, running continuously in one direction, and carrying steam nearly full stroke. If of ample power such an engine could be fitted with a well designed slide valve to cut off from half to five-eighths stroke, when it would do reasonably well; but if such engine had no surplus power, though otherwise of very ample strength, it could be fitted with a new cylinder of such a size as to render a reasonable cut off possible, or the present cylinder could be retained and a condenser added, which would increase the power by about 20 to 30 per cent., and thus allow sufficient margin for a moderately early cut off. The result of this latter alteration would be a decreased consumption of steam, combined with a very material increase of power. If the existing engine were under power, and the proportions not strong enough for an increased load, the only thing to do was to put down a new engine. It would pay better to put in an economical engine, and, therefore, require very little, if any, additional boiler power, than to retain a wasteful engine and have to provide more boilers and probably find them in fuel also. If two-thirds of the steam were provided by boilers in connection with puddling and reheating furnaces, and one-third by firing boilers, then more economical engines, which would use 33 per cent. less steam, would effect a saving not of 33 per cent. in fuel, but of 100 per cent. in fuel together with all the wages spent on firing boilers.

As regarded condensing, there was no difficulty whatever in applying it to engines which were running constantly; it was largely used in South Wales and Staffordshire and gave no trouble. The author then dealt with engines for a more modern steel works, and described two plans for improving the efficiency of the ordinary engine. He followed by detailing the arrangement of engines for an entirely new steel mill, where, he said, it would pay to put down thoroughly economical engines, and as the three-high mill did not find the favor in England that it did abroad, reversing engines would most probably have to be erected. If plenty of water could be had free, condensing would certainly pay, and most likely compounding would also, and there was no serious difficulty in combining both these aids to economy with perfect efficiency. Triple expansion had been talked of, and in the case of a small engine had been carried into practice, but the author thought that the smaller amount of repairs and the less difficulty generally in dealing with more moderate pressures than were required for triple expansion, would give compound engines the advantage until coal greatly increased in price. Where condensing could not be resorted to, well designed simple engines would give results quite as good as compound up to, say, 100 pounds pressure, and in fact the gain by compounding a non-condensing engine was not worth the trouble at anything

under 140 pounds. He did not see any need yet for introducing such a pressure into a rolling mill.

To sum up, if water could be had, he recommended compound condensing engines with about 80 pounds pressure; if water could not be had, simple engines of not more than 100 pounds pressure and an expansion arrangement, which he described. In addition to expansive working steam jacketing would pay on a reversing engine, as by that means the cylinders could be kept as hot as the incoming steam, and there would be no water in them to cause undue strains. A slow moving engine needed a jacket, a high speed engine did not, and reversing mill engines must be classed in the first named category. Another point that had a marked effect upon economy was that of arranging the valves so that any condensed water in the cylinders should be entirely swept out at every stroke.

English Pig Iron and Steel Production.

The British Iron Trade Association has just issued statistics for the year 1893 of the production of pig iron and of Bessemer steel. As will be seen from the table presented below, there was a slight increase in the production of pig iron for 1893 over 1892. The output of the country by districts was as follows:

District.	1892. Tons.	1893. Tons.
Cleveland.....	1,937,469	2,724,184
Scotland.....	917,213	783,867
Cumberland.....	574,246	580,884
Lancashire.....	591,976	593,488
South Wales.....	683,300	679,595
Lincolnshire.....	212,079	194,316
Northamptonshire.....	161,956	142,282
Derbyshire.....	241,842	157,973
Nottinghamshire and Leicestershire.....	276,173	201,357
North Staffordshire.....	238,846	190,365
South Staffordshire and Worcestershire.....	346,725	324,431
South & West Yorkshire.....	244,742	155,598
Shropshire.....	50,107	38,441
North Wales.....	45,573	30,527
Other districts.....	84,643	27,533
Totals.....	6,616,890	6,829,841

Of this production 3,849,694 tons were forge and foundry iron, of which the Cleveland district produced 1,388,043 tons, while Scotland is recorded with 444,867 tons. The production of Bessemer pig, including basic iron produced in the Cleveland district, was 3,130,620 tons, of which the Cleveland district made 1,288,887 tons, while Scotland produced 315,000 tons and South Wales 579,158 tons. The production of spiegeleisen and ferromanganese is given at 169,686 tons, while the output of basic pig was 179,841 tons, exclusive of the quantity made in the Cleveland district. The total stocks of pig iron at the close of 1893 were 868,730 tons, as compared with 872,095 tons for the end of 1892. The stock in the Cleveland district, exclusive of Bessemer and basic iron in makers' hands, decreased from 236,766 to 162,834 tons, while in Scotland the decline was from 443,646 to 381,790 tons. In the Cumberland district there was an increase from 56,349 to 139,163 tons.

The production of basic steel ingots was as follows in the principal districts:

	1893. Tons.	1892. Tons.
South Wales.....	367,405	414,959
Cleveland.....	373,702	312,775
Sheffield.....	215,288	236,937
West Cumberland.....	276,742	227,984
Lancashire and Cheshire.....	193,722	214,352
Scotland, &c.....	66,595	93,803
Totals.....	1,493,454	1,500,810

Of this total, 262,362 tons were basic Bessemer steel, of which 168,538 tons

were made in the Cleveland district, while Sheffield and Leeds are credited with 39,229 tons and Scotland, Shropshire and Staffordshire with 54,595 tons. The production of steel rails is given in the following table, the returns showing a moderate increase:

	1893. Tons.	1892. Tons.
South Wales.....	107,735	114,306
Cleveland.....	174,176	146,504
Sheffield.....	28,391	27,212
West Cumberland.....	152,875	121,346
Lancashire and Cheshire.....	119,216	126,468
Totals.....	579,366	535,836

Complete figures are not available concerning the quantities of different descriptions of Bessemer steel produced in the five principal districts of the United Kingdom. The returns, however, show, including rails, an aggregate of 1,225,786 tons, which indicates that the report is pretty complete. The make of plates and angles is given at 45,952 tons; bars, tin plate bars and forgings at 296,843 tons; sleepers, 31,716 tons; blooms and billets, 206,994 tons; castings, 3749 tons; tires, 14,418 tons, and other descriptions 46,748 tons. These figures prove that the use of soft Bessemer steel has not developed in England as rapidly as it has in the United States.

Scotch Pig Iron Warrants.

The American Pig Iron Storage Warrant Company of New York have issued the following table showing the statistics of Scotch warrants. These have been corrected to date by Connal & Co. of Glasgow, Scotland:

Year.	Extreme prices.		Average number of furnaces in operation.	Production, in tons.	Stock at end of year, in tons.
	Highest.	Lowest.			
1845.....			94	475,000	240,000
1846.....			97	580,000	144,000
1847.....			89	540,000	80,000
1848.....			103	600,000	98,600
1849.....	53/	41/6	112	690,000	210,000
1850.....	51/	41/3	105	595,000	270,000
1851.....	44/9	37/6	112	760,000	350,000
1852.....	77/	35/6	113	775,000	450,000
1853.....	81/	49/	114	710,000	210,000
1854.....	92/3	63/6	117	770,000	120,000
1855.....	83/6	53/6	121	825,000	98,000
1856.....	81/	65/6	126	832,000	88,000
1857.....	83/6	48/6	127	915,000	157,000
1858.....	60/	52/	131	980,000	340,000
1859.....	59/	47/	124	950,000	390,000
1860.....	61/6	49/3	131	998,000	460,000
1861.....	52/	47/	123	1,050,000	578,000
1862.....	57/6	48/	120	1,080,000	676,000
1863.....	69/6	50/3	134	1,180,000	763,000
1864.....	67/3	49/3	144	1,160,000	760,000
1865.....	65/6	50/	136	1,164,000	652,000
1866.....	82/	51/	112	994,000	510,000
1867.....	55/6	51/6	108	1,031,000	473,000
1868.....	54/	51/6	111	1,068,000	568,000
1869.....	58/6	50/6	124	1,150,000	620,000
1870.....	61/6	49/9	126	1,200,000	690,000
1871.....	72/6	51/4 1/2	126	1,160,000	490,000
1872.....	157/6	72/	115	1,090,000	194,000
1873.....	145/	101/3	124	983,000	120,000
1874.....	109/	71/6	96	806,000	96,000
1875.....	77/	57/6	117	1,050,000	170,000
1876.....	66/6	55/9	116	1,103,000	363,000
1877.....	57/10	51/6	103	982,000	505,000
1878.....	52/4	42/3	90	902,000	679,000
1879.....	66/10 1/2	40/	88	932,000	745,000
1880.....	73/3	44/5	106	1,049,000	739,000
1881.....	53/9	45/	116	1,176,000	940,000
1882.....	53/1 1/2	46/7 1/2	108	1,126,000	836,000
1883.....	49/	42/10	110	1,129,000	835,000
1884.....	44/7 1/2	40/10	95	988,000	821,000
1885.....	43/11 1/2	40/7 1/2	90	1,003,000	1,050,000
1886.....	44/7 1/2	37/11	83	935,000	1,183,000
1887.....	47/8	38/5 1/2	80	932,000	1,280,000
1888.....	43/6	37/1	84	1,028,000	1,244,000
1889.....	64/10 1/2	40/10 1/2	84	99,000	1,035,000
1890.....	66/3	43/4	66	798,333	613,445
1891.....	59/	42/1 1/2	51	674,425	579,677
1892.....	47/	40/	76	977,213	443,646
1893.....	51/	40/2 1/2	53	783,867	381,790

It will be observed that the lowest price touched in recent years was 37/1, or \$9. The enormous decline in the stocks from 1887 to date is the most striking feature in the table.

A Fire Proof Dwelling.—We have referred at various times to the increasing use of structural shapes in the smaller classes of buildings. The very low cost of steel has enabled it to be introduced to a gratifying extent in structures of a business character, apartment houses, &c., in which wood would continue to be used if much difference existed in cost. The fact can now be made public that the first dwelling house of steel construction is in course of erection in Chicago. It is to be strictly fire proof and is expected to mark the beginning of a new era in this type of buildings. The house is not a cheap one, as it will cost close to \$40,000, but the use of steel and the fire-proofing have added but \$2000 to the cost if built in the old way. The architects are Beers, Clay & Dutton of Chicago, who have designed and erected many notable buildings in that city and in other parts of the country. They may justly be considered pioneers in this new field.

An aluminum boat, the "Jules Davoust," which has been sent out to the Niger by the French Government for hydrographical purposes, is reported to be an entirely successful experiment. It weighs about 4400 pounds and has a capacity of 11 tons, with a draft of about 15 inches. It is about 40 feet long, 6 feet wide, and 2 1/2 feet deep. There are three masts and a deck cabin, as well as a movable deck tent or pavilion. The sails are of the latest order and easily managed. Two Hotchkiss quick firing guns are mounted amidships. The vessel was built by Lefebvre of Paris, who has already furnished several dismountable vehicles of this metal for the use of the French troops in the Soudan and Tonquin. The lightness of the material makes it valuable for such uses in wild and unexplored countries, as boats or vehicles made of it can be easily carried through the bush. Word comes, also, from France of the use of aluminum for cabs in Paris, where the company L'Urbaine, who own the largest number of hacks in the French capital, are about to use the metal in their construction. The company are now using tin plate for the bodies of their cabs. It is reckoned that an ordinary coupé weighs about 1000 pounds. This weight, it is expected, will be greatly reduced if it is found that the aluminum cabs are a practical success.

The British torpedo boat destroyer "Hornet," built and engined by Yarrow & Co., has completed her first series of trials, and in them earned the distinction of being the fastest vessel afloat. The *Naval Record* gives the mean result of seven runs over the measured mile, and says that the vessel attained a speed of 28.27 knots, which is nearly a knot more than has been claimed by any builder in the world, the fastest rate recorded by a foreign builder being 27.22 knots, which Mr. Normand of Havre claims to have been obtained with the "Chevalier." The "Hornet" is 180 feet in length, 18 feet 6 inches in breadth, and has a displacement of 230 tons. Her total cost, including machinery and armament, is \$164,500.

Tube Sheets and Tubes of Boilers of War Ships.

Engineers are frequently asked the question, "Why is it that the boilers of our naval vessels perform so much better than those of English war ships?" To answer such a query fairly, its inference, so far as it places the latter boilers in a general category of "unsatisfactory," must be denied as contrary to the facts, for it has been the pleasure of eager critics to so flaunt the failures and parade the casualties as to exclude any correct idea of successful designs in use by our cousins over the sea. It is true, however, that we have a greater percentage of satisfactory boilers than they have, and thus, from the rarity of complaints against ours and

the combustion chamber tube sheets, due in turn to overcrowding of the tubes. In no more forcible way can this be impressed than by a reference to Fig. 1, which is a view of the combustion chamber tube sheet of a well proportioned boiler before the tubes are inserted. Not only will the bracing afforded by the tubes be better realized by this graphic illustration of the limited amount of unoccupied sheet to be stayed, but a much clearer idea will be obtained of the difficulty attending the proper supplying of water to where the intense heating surfaces of tubes and sheet combine to evolve steam so rapidly.

When each hole is filled with its tube it will be seen that the narrow channels between vertical rows give passages of not over generous proportions

a given number of cubic feet or to bring the boiler weights down below the safe figure; but when endurance and efficiency are sacrificed by this its folly is made evident, and when no cheap remedy is applicable the extent of the fault is calamitous.

A dim hope of a remedy arose in the form of a ferrule, Fig. 2, which has recently been adopted for the combustion chamber ends of all the tubes and by its construction is supposed to convey the greater part of the heat it absorbs to a point well within the tube where "solid" water may be presumed to surround it, and also it protects the tube ends from the direct action of the flames. But even now we have that, it does not stand the test of service.

Liberal tube spacing and the beading over of the "hot" ends of all the tubes will not, however, obviate the necessity of a forced circulation for efficient performance. Too little attention has been paid to the study of each design so as to locate the natural circulating currents before applying the mechanical assistance, so that in some systems there has actually been produced conflicting currents within the boiler. The rational method of procedure is to adapt the apparatus used to increase the natural down-cast streams, and then to redirect their upward paths as to force more of the volume toward the combustion chamber sheets. Many different methods of forcing a circulation have been devised from special pumps to internal propellers driven by small motors on the boiler faces; but the simplest and best plan is to compel the swift current

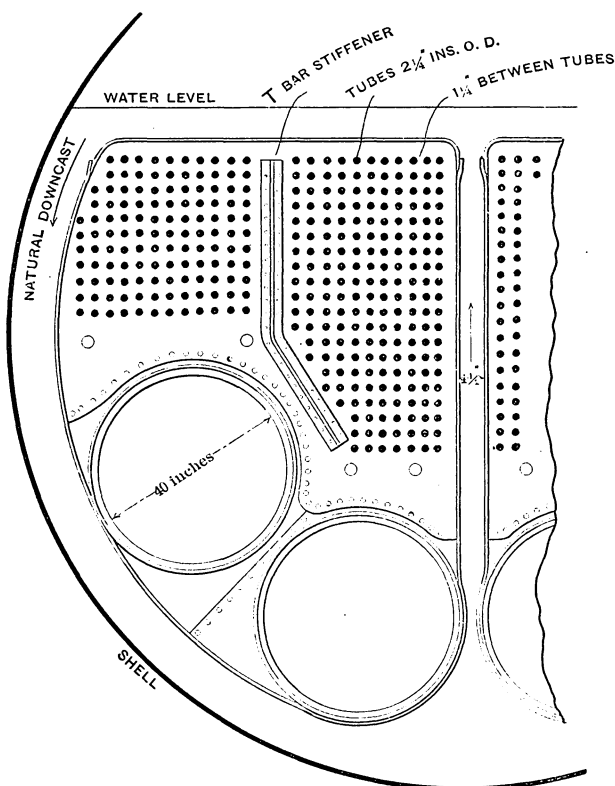


Fig. 1.—Combustion Chamber Tube Sheet.

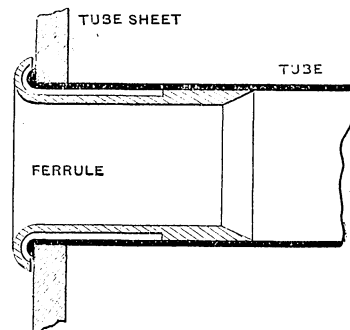


Fig. 2.—Admiralty Ferrule.

TUBE SHEETS AND TUBES OF BOILERS OF WAR SHIPS.

the constantly recurring difficulties they are having with some of theirs, has grown the popular impression which prompts this leading question. Every such failure has its valuable lesson for intelligently observing men, and hence it is safe to say that in our boilermaking we have been careful to avoid the errors we have seen in some of the English boilers. The ability to detect the causes early enough to profit by them is another reason for self-congratulation, and it is to these defects that attention is called by this article.

The parts of the faulty boilers which have shown the most distress are the combustion chamber tube sheets and the tube ends thereat. This is as would be supposed, as they are exposed to the greatest heat and at the same time are the most difficult to keep properly supplied with water to conduct it away.

The proper spacing of the tubes is by far the most important feature of all. It is just here that the vital issue resides, for most of the failures have been undoubtedly due to a lack of water supply to

for the amount of water demanded for proper contact. Experience has taught us that this width should be over one inch, and in the figure it is about one inch and one quarter, but bring the tubes still closer, as they are spaced in so many of the boilers that have failed, until the width of these channels is less than half an inch, and then let the imagination picture the violent ebullition attendant upon a heavy forced draft, and one can easily realize that without a marvelously strong and well directed mechanical circulation there will remain several inches between the face of the tube sheet and comparatively solid water. When this is so, the burning of the tube ends, with the consequent disastrous leaks, is not long delayed.

In our designs we have guarded against this narrowing of the channels and the results are most gratifying. True, the amount of space in a ship for the required power is limited, and faulty boilers are the results of endeavoring to crowd too great power within

of the entering feed water to induce and mingle with the hottest of the water in the boiler, within pipes carried through it, and the combined volume ejected at suitable points, preferably at the bottom, and in the proper direction.

The Scotch boiler, as well as the locomotive type for marine purposes, has nearly served its day and generation. Our aims, hopes and prophecies being for boilers with other kind of tubes—water tubes—and with the test of endurance safely stood, their adoption is certain to be universal.

It was the intention to hold a conference in Youngstown last week between the Valley mill owners and the Amalgamated Association, but it was found impossible to do so, and it will be held some time during this week. The impression grows stronger that the request of the Valley mills for a \$4 puddling rate, in order to compete with Pittsburgh, where that price rules, will be favorably considered.

Geared Power Boiler Feed Pump.

This pump is made in sizes adapted to supply boilers of 60 to 100 horse-power capacity by C. O. Lucas & Co. of Greenville, Ohio. The accompanying engraving shows the general features of the pump. The frame is designed to have ample strength to support the working parts. The bearings are all large, and the gearing is designed to run smoothly and with but little wear. The bearings for the pinion shaft are cast in one piece, so there is nothing to become loose and get out of line. The brass valves are of special design, and are heavier than is usual, and the valve opening is always one pipe size larger than the pipe connections.

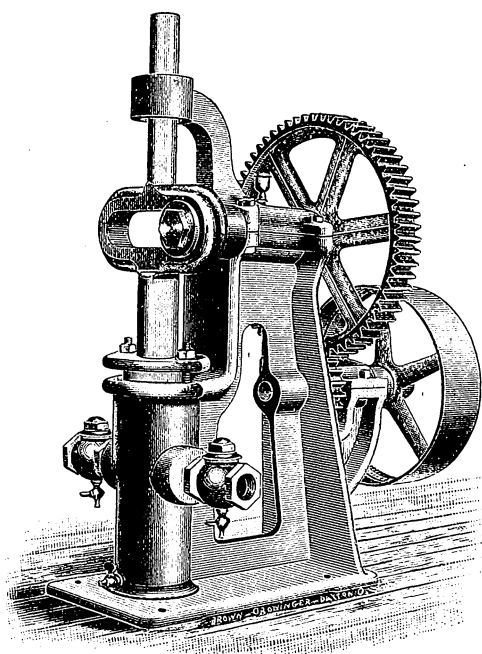
The Needham Process for Treating Wire Rods.

Since its erection there has been in use at the plant of the Pittsburgh Wire Com-

pany the bath. The apparatus is simple and cheap and leads to a saving of labor because the rods or wire require so little handling. Mr. Needham states that there is a considerable saving in lime, since all the lime placed in the vat is used and the vats themselves need not be emptied for five or six months. It has been proved by actual use that there is no perceptible amount of vitriol left in the vats, as the pipes in the bottom, after a use of 16 months, have shown no signs of being affected by vitriol.

It is possible to give the rods a better coat. Mr. Needham has drawn wire from the No. 5 Rod to No. 16 without annealing and without any trouble. By the use of the truck the wire can be better water coated, as it does not lie so compact as on a reel in the old method, so that the lime can readily penetrate to all parts of the bundle, while at the same time the trucks may be loaded as heavily as desired.

But the greatest advantage, according to Mr. Needham, is in the fact that



GEARED POWER BOILER FEED PUMP.

pany a process for treating wire rods, invented by Joseph Needham of Braddock, Pa. Mr. Needham proceeds from the idea that in the usual method of following the pickling of rods with rinsing with cold water, to remove adhering acid, the pores of the metal are closed and considerable acid is retained in the rods. If left in this condition the rods or wire rust and become corroded and brittle. To prevent the action of the residual acid and to facilitate the drawing operation, it is usual to throw lime water or thin whitewash over the coils after they are washed. This, however, Mr. Needham urges, does not completely reach the acid and neutralize the same, and to do this more effectually he proceeds as follows: After the coils are removed from the pickling vat they are placed upon a wheeled truck and a stream of water from a hose is turned upon them. He runs the truck on an elevator and lowers it into a vat containing a bath of lime water heated by a steam coil to a higher temperature than that to which the rods were exposed in the acid bath. He advises that the truck be raised and lowered by a hydraulic cylinder while in

by this system the pores of the rods or wire are opened and the lime penetrates therein, forcing the vitriol out and forming a uniform coating so that it facilitates the drawing of the wire and avoids scraped, broken or run-out wire.

A special meeting of the stockholders of the Western Terminal Company of Cleveland, Ohio, a corporation organized under the laws of Pennsylvania, was held in Pittsburgh last week. The company operate docks at Cleveland, and the stockholders were brought together to vote on a proposition to issue \$100,000 worth of bonds to improve the property. The issue of these bonds was decided upon favorably, and the contemplated improvements will probably be commenced at an early date. A number of Pittsburgh capitalists are interested in this enterprise.

Warren Hibbard of the firm of Hibbard Bros., Sandy Hill, N. Y., has invented and will proceed to manufacture at once a machine for making perfect wooden cogs for mortise gears, to run in connection with iron or steel gears.

Canadian Notes.

The Dominion Parliament is now in session. The speech from the throne promises tariff changes, and the budget is now awaited with some suspense. It is not likely to be forthcoming for some time. The Government delayed the assembling of Parliament to give time for the slow growth of the new United States tariff. Until that attains its final form the indecision of the Canadian Government is likely to continue. In the mean time importers hesitate to bring in their usual spring shipments. We are now on the threshold of the navigation season, stocks in the country are low, but manufacturers pause before placing orders for material. Two classes of changes are expected in the tariff; the one in adjustment to the alterations in the United States tariff, the other in response to the revolt of consumers against protection. But the second class of changes, those demanded by the outcry against protection, should be numerous and considerable if the Government has the fear of the people before its eyes. Protection was never more unpopular than it is now, and the Northwest delegation is all but solid against it on such articles as agricultural implements, nails, wire, binder twine, &c. The iron schedule will surely have to be changed, as it is anomalous, is abortive of protective results to the natural iron industry of the country, and is a burdensome tax on the people.

Expectations of a free American market for our iron ore have led to the application of an Ontario company for incorporation with power to carry on iron mining and to construct and operate a railroad on the north shore of Georgian Bay. The capital stock is \$500,000. The company own a large tract of red hematite deposit at the interior end of the proposed road, and by means of the road they would be enabled to convey the ore to the lake shore and thence to Cleveland by vessel.

A project backed by large capital is said to be on foot for the establishing of great smelting works in Sudbury. Persons connected with the Dominion Coal Company of Nova Scotia and the Canadian Pacific Railroad are credited with the enterprise.

The total output of the three Nova Scotia iron companies last fiscal year was 66,837 tons.

In the Ontario Legislature the other day the Provincial Secretary declined to disclose the cost at which binding twine is produced in the Central Prison.

The binder twine factories at St. John, N. B., now belonging to the Consumers' Cordage Company, were bought by them from John and Thomas P. Conner, who in selling out engaged not to go into the business in this country again. These two men have now the contract to run the penitentiary binder twine works at Kingston. The Cordage Company are proceeding against them for violating their agreement, and the big legal battle has just begun.

The publication by the Montreal *Herald* of the wire nail agreement intensifies the anti-combine sentiment of the farmers.

Until lately Montreal has had an advantage over Toronto and Hamilton in the freight on bright, galvanized, annealed and coppered wires. The difference was enough to handicap these

cities in their competition with the low-priced wire obtainable from the United States, which was rapidly displacing the home wire in the West. The freights have consequently been made uniform in the three cities at the Montreal rate.

Scotch pig iron finds diminishing sale in this country, being driven back from the West by United States irons and being now encountered in the East by a much cheaper and very acceptable domestic Siemens iron. The latter can be laid down in Montreal at \$16.75, while Summerlee costs there \$19.50.

The locomotive works at Kingston have been very busy lately. Last week they turned out three new ten-wheel heavy freight engines for the Intercolonial Railroad, and two similar ones the week before. They are now engaged on two passenger engines and six boilers for the Government road.

The St. Thomas Pipe & Foundry Company, St. Thomas, Ont., is to be reorganized if an agitation for that purpose that has now been started is successful.

A Metal and Hardware Association has been formed in Montreal in connection with the Board of Trade.

The Hamilton Hardware Company, Hamilton, Ont., have been incorporated with a capital stock of \$75,000.

The steel rails for the Hamilton, Grimsby and Beachville electric railroad are to be admitted free. This means a saving of \$10,000. The 1500 tons of rails required for the road have been shipped from England.

The directors of the car works company, Rhodes, Curry & Co., Limited, Amherst, N. S., were all reelected at the company's first annual meeting. They are: Nat Curry, president; N. A. Rhodes, vice-president; J. M. Curry, secretary; J. C. Robertson, consulting director.

The L. H. Young Mfg. Company has been formed in Montreal for the purpose of manufacturing iron and steel and steel rails.

At the sixth annual meeting of the Londonderry Iron Company, held in Montreal, the following Board of Directors were elected: A. T. Paterson, president and managing director; Hon. Donald McInnes, Lord Mountstephen, Sir Charles Tennant, John Turnbull, A. S. McClelland and R. MacD. Paterson. James Phymister was appointed secretary and F. C. Budden treasurer.

Among Canadian rolling mill men there is no mutual confidence lost. Though united in the hands of an association which is supposed to keep the price list inviolable, they cannot be assured that there is fair dealing on all hands. The standard price is \$1.85, but lower figures are said to be obtainable in confidential transactions.

The wholesale hardware house, Thos. Wilson & Co., Montreal, in business for nearly half a century, have been obliged to compromise at 50 cents on the dollar.

The James Morrison Company's brass foundry, at Mimico, a Toronto suburb, was damaged by fire to the extent of \$20,000.

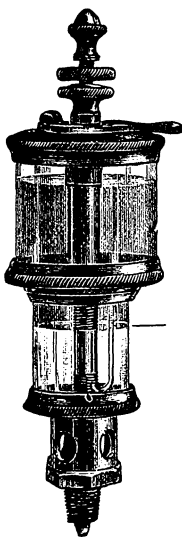
Moore's nail works, near St. John, N. B., were burnt recently.

A leading Canadian iron dealer states that he has the word of a minister for it that the duty on hard iron and puddled

bars will be lowered, while that on wrought scrap will be raised. Hemmed in between an advance in the duty on scrap and a reduction in that on bar iron, the rolling mills will have to use puddled bars, either imported or domestic, to meet the competition from outside.

The Purity Oil Cup.

The Arch Street Mfg. Company of 619 Arch street, Philadelphia, are putting on the market the oil cup shown in the accompanying cut. It is claimed that this cup will purify the oil passing through it, removing from it all grit and dust and the gummy substance found in many lubricating oils. In construction it consists of a hollow spindle passing through two glass cylinders set in a combination brass frame, and connecting at the bottom of the lower cylinder with a glass sight feed tube provided with a brass protector having a connecting nipple. A syphon tube passes from the bottom of the upper



The Purity Oil Cup.

cylinder almost to the bottom of the lower cylinder, where it takes a short upward turn. The knob on the top of the spindle is attached to a valve rod in the spindle, and opens or closes a discharge valve situated at the top of the spindle in the lower cylinder. The two nuts under the valve knob regulate the supply. The clutch or slide on the top of the upper cylinder acts as a supply cut off after the supply has been adjusted. The lower cylinder is provided with a filling tube (not shown in the cut) in the frame, just below the connection of the two cylinders, and covered with a screwed cap. In operation the lower cylinder is filled with water up to the line shown in the cut and the upper cylinder with oil. The desired feed is obtained by separating the two nuts and turning the valve rod by the knob up or down. When the feed is adjusted the top nut is screwed down perfectly tight, the lower nut resting upon the clutch or slide. To stop the feed, the clutch or slide is simply pushed from beneath the nut. To start it, the slide is replaced beneath the nut. The oil is syphoned from the upper cylinder by the syphon tube, passes through the water by gravity, drop by drop, as regulated, all impurities settling in the water and the pure oil rising to the top, where an

opening allows it to pass into the hollow spindle and thence to the discharge.

An Instructive Eye Bar Test.

At a recent meeting of the American Society of Engineers a paper was read on an eye bar test which the *Engineering News* summarizes as follows:

This test was on a bar selected from nine bars 6 x 1 1/8 in size, on account of it showing seams in the head sufficient to cause its rejection. The test showed an elastic limit of 35,400 pounds per square inch, and the bar broke in the head at 41,500 pounds with no elongation in the body of the bar. The fracture was square and granular and started in one of the seams. The head was cut off and the bar reheated, and the new head showed seams also. One of these was chipped out and found to be 1/4 inch deep. At a stress of 60,200 pounds per square inch a piece broke out of the new head with a square and granular section and no visible flaws. The body of the bar showed an elongation of 7 per cent. The specimen test from this bar had given an elastic limit of 36,600 pounds; strength, 63,100 pounds; elongation in 8 inches, 30 per cent.; reduction of area, 49 per cent., and indicated material of excellent quality. The question is, what was wrong with the manufacture to cause the test of the full-sized bar to be so unsatisfactory?

Analysis was made of drillings taken from the face of the second fracture and showed as follows: Carbon, 0.21 per cent.; phosphorus, 0.118 per cent.; manganese, 0.60 per cent.; sulphur, 0.126 per cent. The phosphorus is high, but probably not higher than in at least 30 per cent. of material which is used at the present time. The primary cause of failure was in the sulphur, which is twice as great as the limit set as proper for material which is not to be reheated, and over three times as great as that set for material to be forged. The sulphur at the end of this bar was probably just at the critical point beyond which the steel would have crumbled in rolling, and more sulphur may have been absorbed in the heating. The bar was probably from the extreme top of an ingot, and its behavior is a strong plea for the cropping of ingots, so as to remove that portion into which the detrimental elements have segregated in cooling. The cropping of ingots has always been advocated for the removal of piping and unsoundness, and the segregation which occurs in all ingots seems to make its need imperative.

The example set by the puddlers of the Aetna Standard Iron & Steel Company, Bridgeport, Ohio, in their acceptance of the three turn system, has been soon followed in mills not far distant. The puddlers employed by the New Philadelphia Iron & Steel Company have made a similar arrangement with their employers, and it is stated on good authority that operations at the Reeves Iron Company's plant, Canal Dover, Ohio, will be governed in the same manner whenever the required tonnage reaches a quantity that will warrant such action. At present what little puddling is being done is divided among those workmen who have held their positions during the longest time.

Curtis & Curtis, Bridgeport, Conn., advise us that they are very busy filling large orders for Forbes pipe machines received by cable from England.

The Coale Straightway Valve.

The Coale Muffler & Safety Valve Company of Lexington and Charles streets, Baltimore, Md., make the quick acting straightway valve, which consists of an ordinary steam metal valve body, with a plug valve attached to a spindle of special design, as shown in the engraving. The spindle is made in two parts, a main part and a smaller part, the latter attached to the former by a screw, both parts clutching the T head lug on the top of the valve. The lower part of the spindle revolves upon the top of the plug, and there is a sliding or locking bar placed horizontally in a groove on top of the valve plug. A pin or knock off is cast on the spindle flange to operate a cam or bell crank affixed to a lug or ledge on the inside of the valve case. The cam is kept in position by a bonnet or cap,

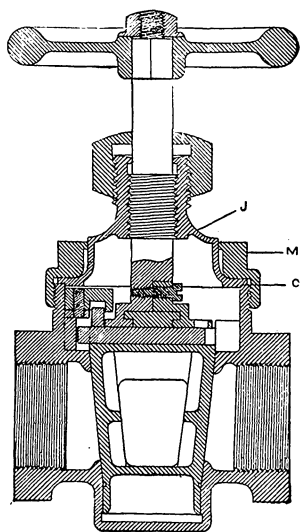


Fig. 1.

practical tests, and in every case gave satisfaction. It is made at present in sizes running from $\frac{1}{4}$ inch to 4 inches.

Meurer Bros. Company's Tin Plate Works.

The new tin plate plant of Meurer Bros. Company, 575-577 Flushing avenue, Brooklyn, N. Y., to which allusion was made in these columns some weeks ago, is so far advanced that the first two tinning pots were put into operation on March 9. The initial product turned out—a roofing plate of Worcester grade—proved eminently satisfactory, and the works will run regularly from now on. The two machines already at work are of the Phillips pattern. Two others, of the Thomas & White pattern, will be installed in the course of a few days, and will be used for the production of bright plates. It is expected that at least six tinning machines will be in active operation day and night by the end of the present month, when the works will be fully equipped in all other respects. The full complement of tinning pots contemplated is ten, but the last four are not yet ready for installment. At present, while working one shift only, an output of 80 boxes of 20 x 28 roofing plates a day is made. This will be increased to 50 boxes per pot, as the men

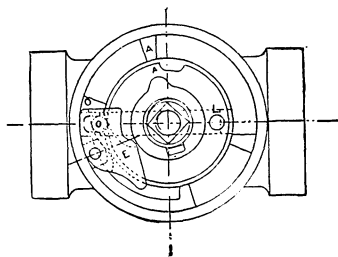


Fig. 2.

THE COALE QUICK ACTING STRAIGHTWAY VALVE.

which fits closely over the spindle and holds it central, at the same time preventing an upward movement of the cam. A lock nut covers the whole and makes a tight adjustment. The seat in the body is extended to form a guide for the valve in its vertical movement. The valve is also guided above the seat by guide wings cast in the casing. This method of guidance prevents any lateral spring upon the spindle during opening or closing of the valve.

Fig. 1 shows a vertical section of the valve, and Fig. 2 a sectional plan. In both figures the letters shown refer to directions for taking the valve apart.

In operation, the first movement of the wheel and stem, which are securely connected, raises the valve without rotation of same, and by means of the cam and knock off the sliding bar is unlocked. By a further rotation of the flange plate the grooved clutch engages with the pin on the sliding bar, when the whole valve becomes governed by the spindle, and a full way or opening results. The movement from the raising of the valve from its seat to the obtaining of a full way or opening necessitates but a half turn of the wheel.

The manufacturers state that the valve has been subjected to the severest

become more expert, and when they have the aid of the cleaning and dusting machinery now on its way. Eventually, it is hoped, with the aid of the full force of ten pots, to reach an output of 1000 boxes a day of 24 hours.

Messrs. Meurers' plant is excellently planned and equipped with the most modern and efficient labor saving devices. A steam pickling machine and steam squaring shears have been ordered, as well as a steam stamping machine for the manufacture of some of the tinned goods dealt in by the firm. Nothing but American black plates are used; and it is the intention of the firm to ultimately establish a rolling mill themselves for the production of this material. All the workmen are Americans, Messrs. Meurer being anxious to make the tin plates turned out by them unquestionable American products.

The Seaboard Steam Coal Association, composed of soft coal operators, have just issued their spring price circular. The prices given in the circular for Philadelphia, Baltimore and Hampton Roads are \$2.25 f.o.b. per ton, and for New York \$3 alongside pier. This is a reduction of 25 cents per ton in the present price.

Influence of Silicon, Sulphur and Manganese on Foundry Irons.

BY J. B. NAU, ALLEGHENY, PA.

In some of the last numbers of *The Iron Age* there appeared in the transactions of the Foundrymen's Association some important facts about the treatment of foundry iron in the cupola. In the discussion of this question attention was especially called to the influence exercised on the iron by the three elements, silicon, manganese and sulphur. The writer, having had some experience in this line, thought it advisable to make use of your paper to publish the results of some tests made with different kinds of iron in the cupola. At the same time he intends quoting here the most important points of the results of tests made years since by such men as R. Akerman and others with a view to clearly define the influence that the three elements, silicon, manganese and sulphur have on pig iron. A full account of those tests was published in the time by R. Akerman, professor at the School of Mines at Stockholm, and translated later by Joseph Von Ehrenwerth, professor at Leoben.

Silicon, as is well known by every foundryman, is met with in every kind of pig iron, since it is impossible to obtain pig iron in a blast furnace without the presence of a cinder containing more or less siliceous matter in its composition. But the amount of this element found in the iron will vary greatly according to the surroundings in which the iron is obtained. A high temperature, for instance, is very favorable to an increase of silicon in the iron, whereas low temperature always tends to decrease the silicon contents.

Gray iron, which, as every furnace-man knows, is obtained in a furnace at a higher temperature than is required for white iron, most generally contains a higher percentage of it than the latter iron does. It is even due to the presence of this increased amount of silicon that the iron becomes gray. Silicon, indeed, has the power to eliminate carbon from its combination with iron, and the so liberated carbon crystallizes in the shape of graphite and gives to the iron its gray appearance. It is on account of lower temperature in a charcoal furnace that charcoal iron contains less silicon than iron made in a coke blast furnace. This, however, is also attributable to the fact that charcoal not only contains less ash than is carried by coke, but this ash also is poorer in siliceous matter. Gray iron, with a high percentage of silicon, is softer than white iron. This mostly is supposed to be due to the presence of a higher percentage of silicon, but it might more correctly be considered as a consequence of a larger amount of carbon in the shape of graphite. White iron, with little silicon and all of its carbon in the combined state, is harder and more brittle than gray iron. Silicon itself is known, on the contrary, to make iron slightly harder in the absence of carbon, and the iron that contains it can be hardened afterward to a certain extent, though in a very much lesser degree than iron containing carbon in a combined state. The writer, who in former years had occasion to treat high silicon iron in the Bessemer converter, could observe many times that steel rails, for instance, though containing sometimes a relatively high amount of silicon, were still good and tough with-

out too much hardness if the carbon contents remained within certain limits. Though silicon has the tendency to eliminate carbon from its combination with iron it must not be believed, however, that white or mottled iron cannot contain enough silicon to make it gray in ordinary circumstances. White iron, on the contrary, sometimes contains a high amount of silicon. The physical appearance of the iron is, indeed, very largely influenced by the treatment that the iron is submitted to. If gray foundry iron is cast in a cast iron mold that part which is in contact with the mold will chill rapidly, and the carbon contained in the iron has no time to be driven out of its combination with it, the iron becomes white and its grain closer in the part in immediate contact with the cast iron mold. This fact is well known to every foundryman who has to do with chilled casts. Again, white pig iron cast in sand or in a heated mold and cooled slowly becomes white or mottled. Thus it may happen that a good foundry iron, which in every respect would give good castings, may have the appearance of gray mill iron, and for this reason may be considered as unfit for foundry purposes. The analyses of the iron, however, would show all the characteristics of a good foundry iron, and if it had been cast under the right conditions its outward appearance also would have changed. In this case (and such cases happen every day in foundry practice) an analysis would have solved the question at once.

While the above shows one of the reasons why a gray foundry iron may become white or mottled there are still other causes of a chemical nature that will produce the same effect. The presence of some other elements in the iron, such as manganese and sulphur, also has a great influence on its general appearance.

Manganese.

Manganese when present in large quantities contributes to make the iron white. This is well illustrated in spiegel, which, though it contains a much larger amount of carbon than ordinary pig iron, is always white. Ordinary pig iron generally contains from 3.0 to 4 per cent. of carbon, seldom more, while spiegel contains seldom less than 5 per cent. and mostly more carbon. Nevertheless, spiegel is always white, even when it contains as high as 1 per cent. of silicon, which happens sometimes. This shows that the action of manganese on the carbon contents of the iron is so pronounced that it even counterbalances the well-known action of silicon to separate the carbon from its combination with iron. This same tendency of the manganese is further illustrated in the manufacture of steel and iron.

In the puddling furnace manganiferous irons are more difficult to refine than irons containing only small amounts of this element. The operation lasts longer, as it will be found more difficult to eliminate carbon. Again, difficulties in obtaining dead soft steel are increased in the Bessemer vessel, as well as in the open hearth furnace, by the presence of too high a percentage of manganese.

Another case of this tendency of the manganese is illustrated in the following fact: A few years ago, when the writer was engaged in the manufacture of basic Bessemer steel, it happened that sometimes the quality of the steel was not up to what it was expected to be. This, however, was very

rarely due to too large a percentage of phosphorus in the steel, since we were always able to absolutely control the elimination of that element; but we soon discovered that it was mostly traceable to the presence of sulphur. Now, since only a small proportion of it is eliminated in the converter, the mixture of the iron in the cupola had to be looked after. In such cases, among other things, we used to add to the mixture an iron containing as high as 2½ per cent. of manganese, which had a good effect in the elimination of sulphur. This iron, which we made ourselves and of which we had at times a pretty good stock on hand, contained often from 1.2 per cent. to 1.5 per cent. of silicon. In spite of this high percentage of silicon it never was gray, but always white on the outside and scarcely mottled in the interior.

All these facts show clearly enough that manganese favors the combination between carbon and iron. Its influence, when present in sufficiently large quantities, is even great enough not only to keep the carbon which would be naturally found in pig iron combined to the latter, but it increases the capacity of iron to retain larger amounts of carbon and to retain it all in the combined state.

Since everything points to the fact that manganese in pig iron tends to increase the propensity of the iron to become white, the belief that it also has the power to increase the chilling qualities of it is not far off. Manganese iron, indeed, is pretty often used for foundry purposes when some chill and hardness of surface is required in the casting. For the rolls of our steel rail rolling mills, which we generally cast ourselves, we always put into the mixture a large amount of manganiferous iron and the rolls so obtained always presented the desired hardness of surface and in general a mottled structure on the outside. The inside, of course, which always cooled much slower, was gray iron. One of the standard mixtures that invariably gave good results and to which we stuck closely was the following:

- 50 per cent. of foundry iron with 1.3 per cent. silicon and 1.5 per cent. manganese.
- 35 per cent. of foundry iron with 1 per cent. silicon and 1.5 per cent. manganese.
- 15 per cent. steel (rail ends) with about 0.35 to 0.40 per cent. carbon.

The roll resulting from this mixture contained about 1 per cent. of silicon and 1 per cent. of manganese.

Another mixture, which differed but little from the preceding one, was as follows:

- 45 per cent. foundry iron with about 1.3 per cent. silicon and 1.5 per cent. manganese.
- 30 per cent. foundry iron with about 1 per cent. silicon and 1.5 per cent. manganese.
- 10 per cent. white or mottled iron with about 0.5 per cent. to 0.6 per cent. silicon and 1.2 per cent. manganese.
- 15 per cent. Bessemer steel rail ends with about 0.35 to 0.40 per cent. carbon and 0.6 to 1 per cent. manganese.

The pig iron used in the preceding mixtures contained also invariably from 1.5 per cent. to 1.8 per cent. of phosphorus, so that the rolls obtained therefrom carried about 1.3 per cent. to 1.4 per cent. of that element. The last mixture used produced rolls containing in the average 0.8 per cent. to 1 per cent. of silicon and 1 per cent. of manganese.

The rolls obtained from these mixtures, as well as from several other mixtures that we used for that purpose, but

that did not vary very materially from the above standards, except sometimes in the use of a certain proportion of non-phosphorous iron, were always good. Their surface, slightly chilled to a certain depth, was hard enough to allow us to roll on the average from 600 to 1000 tons of rails in the finishing groove. The railway companies were so extremely exacting as to the correct shape of the rails that the last rails rolled in this groove before changing the rolls had to be as perfect as the first ones. I may add that whenever we tried to make those rolls from a mixture containing but 0.2 to 0.3 per cent. manganese our rolls were invariably of inferior quality, grayer, and consequently softer. The rails made in these rolls soon got out of shape on account of the too great softness of the rolls. All this sets forth clearly the tendencies of manganese to harden the iron of which it is a constituent and to increase the affinities of carbon for iron, thereby making the latter white. On the other hand, it also shows that manganese iron cannot be used indiscriminately for foundry purposes. When greater softness is required in the castings manganese has to be avoided, but when hardness to a certain extent has to be obtained manganese iron can be used with advantage.

Another characteristic of manganese is the facility with which it decreases the magnetism of the iron. This characteristic increases with the percentage of manganese that enters into the composition of the iron. The iron loses all its magnetism when manganese reaches 25 per cent. of its composition. This particularity has been made use of by French metallurgists to draw a clear line between spiegel and ferromanganese. When the pig contains less than 25 per cent. of manganese it is classified as spiegel and when it contains more than 25 per cent. it is classified as ferromanganese. For this reason manganese iron has to be avoided in castings of dynamo fields and other pieces belonging to electric machinery, where magnetic conductivity is one of the first considerations.

On the whole, however, manganese exercises rather a beneficial influence on the quality of iron, but where it renders still greater service is in the action that it exercises on sulphur.

Sulphur.

This last element, in whatever shape it may be present, has a deleterious influence on the iron. These influences are manifested in many ways. Chemically speaking, it has the tendency to render the iron white by the influence it exercises on the combination between carbon and iron, whose affinities for each other it increases, at least when these two elements are in the combined state. Sulphur, furthermore, renders iron or steel red short. Its presence is easily detected by an experienced eye on account of the darker color it imparts to the metal. Pig iron and foundry iron containing a certain percentage of it become porous and full of holes, and castings made from sulphurous iron are of inferior quality. This, however, happens especially when the element is present in more notable quantities. It has, indeed, been observed that with foundry iron containing as high as 0.1 per cent. of sulphur castings of greater strength could be obtained than when no sulphur is present. Thus in some tests on this element quoted by R. Akerman it is stated that in the foundry iron from Finspong used in the manufacture of cannons a percentage of 0.1 per cent. to

0.14 per cent. of sulphur in the iron increased its strength to a considerable extent. This fact seems to be corroborated by the other, that wrought iron containing as high as 0.1 per cent. of sulphur, rendering it red short, is, nevertheless, very strong and tough when cold. However this may be, there is no doubt but that in a general way sulphur decreases the quality of the iron to a considerable extent, and every precaution ought to be taken to eliminate it.

In ordinary foundry practice, however, this is not very easy. Here sulphur can only be diminished in the cupola and the conditions of this furnace do not always permit of getting rid of sulphur, and this for the reason that the percentage of it found originally in the iron put in the cupola is liable to be further increased by part of the sulphur that is invariably found in the coke used. It is seldom indeed that a coke with a small percentage of sulphur is found, whereas coke containing 1 per cent. of it and over is a very common thing. With such a fuel in the cupola, if no special precautions are resorted to the percentage of sulphur in the metal will in most cases be increased. Several years ago the writer had occasion to make some experiments to that effect. The pig iron that we used in the basic Bessemer process was mostly white or mottled iron carrying in the average from 0.6 per cent. to 0.8 per cent. of silicon. However, sometimes it was necessary to work up some grades of pig iron in stock and in that case it happened that the iron tapped from the cupola was white, because the mixture contained a larger amount of iron of inferior grade. While we were well aware that thereby the sulphur contents in the steel would be slightly increased, we thought, however, that it would still be low enough not to injure the quality of the rails made from it. But we noticed soon that the amount of it was larger than we had expected from the mixture charged in the cupola. This being the case, it was only natural to suppose that the sulphur contents of the pig must have been increased by the sulphur contained in the coke used. In order to find this out we decided to make some experiments in the cupola. Seven consecutive heats were made. The amount of sulphur and of silicon contained in each grade of iron entering into the mixture had been carefully determined beforehand. The ash of the coke, as well as its composition, had also been ascertained. The sulphur contents of this coke was 1 per cent. and 11.7 per cent. of fuel was added to the charge. The amount and analysis of limestone used were also known.

With these data established the following table will show the silicon and sulphur contents of the pig iron of these seven heats before and after melting in the cupola:

Number.	Before melting.		After melting.		Loss in silicon.	Gain in sulphur.
	Silicon.	Sulphur.	Silicon.	Sulphur.		
1.....	0.771	0.085	0.396	0.166	0.375	0.081
2.....	0.463	0.089	0.361	0.156	0.102	0.067
3.....	0.600	0.088	0.500	0.132	0.100	0.044
4.....	0.320	0.090	0.110	0.160	0.210	0.070
5.....	0.387	0.090	0.233	0.182	0.154	0.072
6.....	0.830	0.076	0.490	0.174	0.340	0.098
7.....	0.830	0.076	0.534	0.171	0.296	0.095

From this table several conclusions may be drawn:

1. In all the charges without exception

sulphur has been increased in the pig iron after its passage through the cupola. In some cases this increase more than doubled the original amount of sulphur found in the pig iron.

The seven charges were all made in the same manner and without taking any more precautions than were taken when a better mixture of pig iron was used. The principal aim was to obtain definite information as to the ordinary run of the work and to find out how far it would be safe, without danger to the quality of the steel, to decrease the quality of the mixture in the cupola.

2. In charges 6 and 7, and also to a lesser extent in charge 1, the silicon content of the mixture before its passage through the cupola was highest. It may be noticed that in these same charges the increase of sulphur was highest, while on the other hand the decrease of silicon reached a maximum. This can easily be explained through the fact that more silicon being eliminated from the iron the slag in those same charges was of a more acid character, and in presence of a siliceous slag, as is well known, sulphur has greater tendencies to be incorporated in iron than when a basic cinder is present. Consequently the increase of the sulphur contents in the iron naturally must follow the elimination of a greater amount of silicon from that same iron. A larger amount of limestone added to these charges would have produced a more basic cinder, and undoubtedly less sulphur would have been incorporated in the iron.

3. The seven charges being all made with pig iron containing little silicon, the loss of this element is proportionately greater in percentage of the whole amount than would have occurred with a higher grade iron. For this reason they cannot be taken as giving a correct indication as to what would have happened if foundry iron had been used. In all of the seven charges the amount of silicon lost varied from one sixth to one-half, or from 17 to 50 per cent., of the whole silicon contained in the metal. A loss of 50 per cent. of silicon in foundry iron will generally not occur in the cupola, but rather 20 to 25 per cent. of it may be considered as a fair average for that kind of iron.

4. As already stated, the proportion of coke used in these charges amounted to 11.7 per cent. of the weight of pig iron smelted. This coke contained 1 per cent. of sulphur, and if all its sulphur had passed into the iron there would have been an average increase of 0.12 of sulphur for the seven charges, while the real increase in the pig iron amounted to only 0.081. This shows that two thirds of the sulphur of the coke was taken up by the iron in its passage through the cupola.

The conclusion to be drawn from these experiments is that whenever coke containing notable quantities of sulphur is used in the smelting the danger of increasing the sulphur content of the ore is great, and this danger can only be avoided by the use of a more basic slag. The amount of limestone has to be increased. Another means that we often applied in such a case was to add a certain amount of fluorspar to the charge. This material produced a very liquid cinder, and through the calcium that is one of its constituents it has an excellent effect on the elimination of sulphur. Still another means that is universally resorted to to decrease the sulphur contents in pig iron used in the manufacture of steel is manganese. This element is a more powerful agent than lime.

When lime is used to eliminate sulphur, the latter will be carried off in the shape of sulphide of calcium. When manganese is used sulphur will be eliminated as sulphide of manganese. In both cases calcium, as well as manganese, have first to be reduced from their own combination (lime and oxide of manganese). Now, as it is much easier to reduce oxide of manganese than it is to reduce lime, it follows that the action of manganese on sulphur is quicker than the action of lime on sulphur and that this action will take place at a lower temperature. The process known to-day under the name of the "Hoerde process," where sulphur is eliminated nearly completely from molten sulphurous pig iron by mixing it with molten manganiferous iron, is based on that principle.

But in a cupola, when no special precautions are taken, the elimination of sulphur from the iron is generally weak and in most of the cases when coke containing sulphur is used the contrary happens, as shown by the preceding table. For ordinary foundry purposes it would not pay to use a more costly mixture. When, however, the circumstances are such that a very pure pig iron has to be drawn from the cupola and the price of the product to the manufacture of which such a purified iron is destined makes it possible to resort to more vigorous means in the cupola, sulphur and even phosphorus can be pretty thoroughly expelled from ordinary pig iron. Thus, in some French iron works, and possibly also in other places, of which, however, the writer has no knowledge, a pig iron of exceptional purity is required in the manufacture of boiler plate, fire boxes, armor plate, &c. Ordinary pig iron containing 0.70 to 0.75 per cent. of silicon, 0.500 per cent. of manganese, 0.16 per cent. of sulphur and 0.053 per cent. of phosphorus is treated by a special method in a cupola. The result of the operation is a product where sulphur has been reduced from 0.16 per cent. to 0.005 per cent. and less, and phosphorus from 0.053 to 0.01 per cent. and less. This pig is afterward used to make wrought iron or steel equal to the Swedish brands. It is added to the mixture in an open hearth furnace where steel for boiler plates and fire boxes is made. Without entering into any more details of the method itself or the general arrangement of the cupola used for the purpose, the method being of no special use for foundry practice, I may state, however, that about 60 to 70 tons of pig can thus be purified in a cupola in 24 hours at a cost of about \$10 per ton over and above the price of the original iron. The total loss of iron resulting from the smelting in the cupola is only about 4 per cent. For the purpose used it still constitutes a very cheap method, especially when it is considered that in France Swedish iron of a quality not superior to that produced from this purified pig iron is sold as high as \$120 and \$130 a ton.

Before concluding I wish to mention some points only of experiments that the writer made with a cupola about three years ago. The cupola used is the Herbertz steam jet cupola, of which a full description was published in *The Iron Age* of June 18, 1891. The most important feature of this cupola is the absence of tuyeres.

Good results were obtained by this furnace in a certain direction. There is no doubt that on account of the annular space the air is allowed to enter uniformly all around, thereby

creating a most uniform combustion in the melting zone. Furthermore, since the regulation of this air is entirely controlled, only that amount can be let in that will be absolutely necessary for the combustion of the coke. This happens, indeed, to a marked degree in this cupola. Tests made in Germany on combustion gases issuing from this furnaces showed conclusively that all coke had been burned in the first test to carbonic acid without any trace of carbonic oxide, and in a second one they contained only a small percentage of carbonic oxide. These good results are undoubtedly due to the great regularity with which the air enters the furnace. They may be furthermore due partly to the gentleness with which the blast comes in contact with the fuel. The pressure with which the air enters is indeed extremely small, about equal to a column of water 3 to 4 inches high. The fuel consumption also is considerably reduced and does not amount to more than 6 per cent. of the weight of iron, or 1 pound to 17 pounds of iron. The loss in iron amounts to between 3 and 3½ per cent. Another feature of great importance, and undoubtedly due also to the regularity of the combustion without considerable excess of air, is the reduced loss of silicon and manganese during the smelting. The following table giving the results of some experiments will indicate the losses of these elements:

	First test.			Second test.		
	Carbon.	Silicon.	Manganese.	Carbon.	Silicon.	Manganese.
Composition before melting.....	4.0F9	2.523	1.273	4.154	2.056	0.738
Composition after melting	3.945	2.406	1.222	3.682	1.846	0.587
Absolute loss	0.114	0.117	0.151	0.472	0.210	0.249
Loss in per cent. of original amount.....	2.8	4.6	11.8	11.2	10.2	31.7

This table shows that the loss of silicon and manganese as well as carbon is considerably reduced when compared with ordinary cupola practice, where it generally amounts to 20 and 25 per cent. for silicon, and often more for manganese. In other words, blowing gently and as uniformly as possible all around the cupola decreases the loss of iron and also makes it possible to put into the mixture foundry irons with less silicon content, since less of this element will be burnt out. But less silicon in the iron generally means cheaper iron to obtain the same results.

A delegate convention of the miners of the Connellsville coke region was held last week in Scottdale, Pa., to discuss the wage question, L. R. Davis of Uniontown presiding. The scale question was placed in the hands of a Wage Committee to prepare a schedule and report at another meeting, to be held at the same place this week. Of the 16,000 or more miners in the Connellsville region, it is claimed that about 5000 have been reorganized into the United Mine Workers, and it is expected that delegates will be present at the meeting this week from the places where no organization exists. One of the delegates to the convention held last week stated that a circular letter has been sent to all the coke operators requesting them to meet the miners' representatives in conference on the scale question at Scottdale this week. The men intend, if possible, to secure a uniform rate of wages throughout the region.

Pittsburgh in the Pig Iron Trade.

Our regular monthly blast furnace report, printed on March 8, showed that on the first day of this month the active blast furnaces possessed a weekly capacity of 110,616 tons of 2240 pounds. This includes the coke, charcoal and anthracite furnaces. At the present time, out of 26 stacks in the Pittsburgh district, only two are idle, these being Soho of the Moorhead-McCleane Company, which has been idle for about three years, and one stack of the Isabella Furnace Company, which has been idle since July of last year. The combined weekly capacity of the 26 blast furnaces in Allegheny County is between 41,000 and 42,000 tons, so that the Pittsburgh district is now producing considerably more than one-third of all the pig iron made in the entire country. Of course the largest maker of pig iron in that district is the Carnegie Steel Company, Limited. Owing to the idleness of a number of furnaces of the Illinois Steel Company, the Carnegie interest is considerably the largest producer in the country. At the Edgar Thomson plant of this firm are nine stacks, seven of them being on Bessemer, the weekly output being between 15,000 and 16,000 tons. The other two stacks are on spiegel and turn out close to 1000 tons per week each. At the two Lucy furnaces of this concern the weekly output

the manufacture of Bessemer steel billets. The two stacks of the Carrie Furnace Company are now in operation, the second one having started last week. The weekly output is between 3000 and 3500 tons. Clinton, of the Clinton Iron & Steel Company, is the smallest and also the oldest stack in Allegheny County, having been built in 1859, but was rebuilt in 1889-90. The product of this furnace is largely used by the Clinton Iron & Steel Company. From the above it will be seen that while Pittsburgh is making considerably more than one-third of all the pig iron now being made in this country, it is all used in the steel plants and rolling mills there, and the Mahoning and Shenango valleys are being drawn on right along for additional supplies. The past nine months have demonstrated very thoroughly that the facilities of Pittsburgh for the manufacture of pig iron and the finished products of iron and steel as well are certain to make that city the main producing center of these products for many years to come. For months Pittsburgh has dominated the iron and steel markets of the country, while makers East and West have been compelled to see trade slipping from their grasp because they were unable to meet the low prices which the equipment and natural advantages of Pittsburgh mills enabled them to name. This enviable position of Pittsburgh in the iron and steel trades to-day is largely due to her facilities for the cheap production of raw material, and which also applies right through the whole line of finished products.

Wire Rope Prices.—On account of the cheapened cost of raw material the manufacturers of iron and steel wire rope have announced under recent date that, taking effect on Monday, March 19, the discounts on all sizes of wire rope will be 50 per cent. from list, the former discount being 45 per cent. Although the wire rope industry in this country is of considerable magnitude, its manufacture is confined to only eight concerns, seven of these being located east of the Rocky Mountains and the other on the Pacific Coast. The seven Eastern concerns are the Hazard Mfg. Company, Wilkesbarre, Pa.; J. A. Roebling Sons Company, Trenton, N. J.; Trenton Iron Company, Trenton, N. J.; Washburn & Moen Mfg. Company, Worcester, Mass.; Williamsport Wire Rope Company, Williamsport, Pa.; Broderick & Bascom, St. Louis, Mo.; and A. Leschen & Sons Rope Company, St. Louis, Mo. For some years these concerns have operated under an agreement or association, by which each concern is pledged to observe established prices, but they are not restricted as to territory, each maker being allowed to sell in whatever territory he may desire. The largest consumers of wire rope are the cable street railways, the demand from this source having been very heavy for some years. Wire cables for street railway use are furnished at so much per pound, while to all other buyers it is sold at a price subject to discount.

The latest thing pointing to the decrease in draft for heavy implement machinery is the application of ball bearings to binders and mowers by William Deering & Co., Chicago manufacturers.

The battle ships "Iowa" and "Brooklyn," now under construction at the Cramps' shipyard, Philadelphia, will be ready for launching in the fall.

The Finished Iron Market
of Canada.

Structural Shapes and Rails.

With the exception of small quantities of angles and a few tees and channels, the product of the Nova Scotia Steel & Forge Company, Limited, of New Glasgow, Nova Scotia, there are no structural shapes rolled in Canada. Therefore, practically all the iron and steel material of this class which enters into the construction of bridges, buildings and ships has to be imported. The larger part of this structural material is imported and used by the bridge companies, whose operations include general building work, as well as the construction of bridges. The most important of these companies are the Dominion Bridge Company and the Canadian Bridge & Iron Company of Montreal, Province of Quebec; the Hamilton Bridge Company of Hamilton, Ontario; the Central Bridge Works of Peterboro, Ontario, and the G. & I. Brown Mfg. Company of Belleville, Ontario. The quantity of shapes used is increasing yearly, the total of all classes of structural material imported in the fiscal year 1893 being 33 per cent. greater than in the previous year, as will be seen from the accompanying

to erect a plate mill for rolling steel plates up to 48 inches in width. It is therefore expected that the protective duties on plates and shapes in the new tariff will be correspondingly extended. The customs officials have credited Great Britain as the producer of much the greater part of the structural material imported by Canada. For ship material this is correct. Angles form a large part of the total tonnage—and most of them come from Great Britain—as well as sheared plate and tees: but beams and universal mill plates, as is well known, come mostly from Germany and Belgium, as well as a goodly share of the channels. Shipments of Continental material through English houses probably accounts for the undue swelling of Britain's tonnage. The figures in the table show a relatively greater increase in the imports from the Continent than from the United Kingdom. Some difference of opinion has been expressed regarding the quality of Belgian beams, but those most familiar with them claim to be well satisfied with the Belgian as well as the German article. All ordinary requirements as to character of material are readily complied with by the makers. The ordinary Belgian section is heavier than the American designed for the same purpose, but the Continental manufacturers also roll the Carnegie light sections of 12, 15 and 20 inch beams. The following quotations are given as representing European prices on structural

cents and even lower), they will doubtless be in a hurry to reduce the quotations in the table as much as their margins of profit will permit. How great these margins are it would be difficult to ascertain. But it is safe to say that the European is as anxious as the American manufacturer that the downward movement in American prices shall be speedily arrested and an upward movement begun. If the latest rumors of the prices of angles at Pittsburgh be confirmed, the American rate would be on a par with the European, leaving the latter to feel safe only with beams, channels and tees. With equal prices, however, the European would have the advantage over Pittsburgh in freights to Montreal in summer time. The Pittsburgh freight rate to Montreal is 21 cents per hundredweight. From Antwerp to Glasgow the summer rate is rarely below 8 or above 12 shillings per ton. To Toronto Pittsburgh has a 15-cent rate, giving the American the advantage at points west of Lake Ontario. The European quotations, however, are subject to a discount of $2\frac{1}{2}$ per cent., which is more than the usual American discount on structural material. If a Canadian contract has to be promptly carried out in winter time the order for material is likely to go to the United States even at much higher prices than those prevailing in Europe, on account of the greater facilities for quick transmission at that time of the year. Freight also on material from Belgium or Scotland to Montreal is then about 24 shillings per ton, or more than double the summer rate, as the articles are landed at Portland or Boston to be forwarded by rail. It is scarcely necessary to add that Canadians are carefully watching the downward slide of prices on finished material across the border, predicting, meanwhile, that it can only be temporary, as they overlook the facts concerning the astonishing drop in raw materials. Of steel rails Canada now uses about 100,000 long tons annually. The importations in the fiscal year 1892 amounted to 86,449 short tons, valued at \$1,849,824, and in 1893 to 115,225 short tons, valued at \$2,319,775. The United States supplied of these quantities 9522 tons, valued at \$252,655, in 1892, and 5504 tons, valued at \$155,798, in 1893. All the remainder, except a few hundred tons in 1893 from Germany and Belgium, came from Great Britain. Steel rails weighing 25 pounds or more per yard are on the free list, but lighter rails of iron or steel pay a duty of \$6 per ton in order to encourage their production by Canadian rolling mills, three of which in the maritime provinces sometimes roll mine rails. The quantities of these light rails included in the foregoing figures were 3702 short tons in 1892, and 14,076 tons in 1893, only 326 tons coming from the United States last year, against 1573 tons in 1892. The bulk of the Canadian rail trade will continue in British hands while prices for standard sections in England continue at £3. 12/6 (\$17.62) per long ton and American prices are held at \$24. If American rails, however, had continued to be sold at the low rates at which certain contracts were made last fall, when the rail combination was disintegrating, there would be a speedy curtailment in British exports, as the prices of rails in England under present conditions of the industry there can scarcely go much lower. But the American rail combination is now cemented again, and the Canadian rail consumption is not yet sufficiently large to tempt American

Description.	Duty.	From	1892.		1893.	
			Short tons.	Value	Short tons.	Value.
Iron bridges and structural iron work, n.e.s....	$1\frac{1}{4}$ cents per pound or not less than 35 per cent..	Great Britain..... Belgium..... United States.....	$1425\frac{5}{8}/2000$ 30 30	\$42 27,321 13,189	24 554 409	\$14,953 38,981 10,663
Iron or steel angles, channels, structural and special shapes weighing less than 25 pounds per yard	$\frac{1}{2}$ cent per pound and 10 per cent..	Great Britain..... Belgium..... France..... Germany..... United States.....	472 12 17 11 81	13,189 254 393 284 4,079	409 117/100 4 4 116	10,663 50 104 4,733
Iron or steel beams, girders, joists, angles, channels, structural and special shapes weighing not less than 25 pounds per yard	$12\frac{1}{2}$ per cent..	Great Britain..... Belgium..... France..... Germany..... United States.....	2,776 70 108 464 347	75,158 2,678 3,206 10,816 15,337	3,699 98 60 893 370	94,718 2,973 1,387 21,290 16,322
Beams, girders, joists, angles, channels, and all other structural shapes of rolled iron or steel, including rolled bridge plate not less than $\frac{3}{8}$ inch thick, nor less than 15 inches wide, when imported for bridges by bridge manufacturers	$12\frac{1}{2}$ per cent..	Great Britain..... Belgium..... Germany..... United States.....	2,653 124 342 239	74,900 2,700 9,037 8,316	3,325 764 583 139	78,804 17,164 12,297 6,535
Iron or steel beams, sheets, plates, angles and knees for ships....	Free	Great Britain..... Belgium..... United States.....	1,410 130 130	52,635 6,516	1,287 121 50	33,808 3,110 2,199
Total.....			9,517	\$306,801	12,718	\$360,100
From United States.....			1,097	\$61,569	1,229	\$68,770

ing table, which also shows the duty on each class of material and the country from which obtained. It will be observed that there are protective duties on the articles named in the first two classifications in the table. The duty on the first class is levied, of course, to protect the bridge companies against the importation of completed structures, and on the second class for the benefit of the rolling mills, but only one mill, as before mentioned, has taken advantage of the duty, and that one to but a limited degree. It is stated, however, that the Nova Scotia Steel & Forge Company propose to engage more extensively in this work, and also

material at the present time per ton of 2240 pounds:

	£	s.	d.	Cents per pound.
Beams, not above 15 inches, f.o.b. Antwerp.....	4	4	0	0.91
Beams, 20 inches, f.o.b. Antwerp.....	5	2	0	1.11
Channels, f.o.b. Antwerp.....	5	0	0	1.09
Universal mill plates, f.o.b. Antwerp.....	5	15	0	1.25
Sheared plate, f.o.b. Glasgow.....	5	10	0	1.19
Angles, f.o.b. Glasgow.....	4	12	6	1.10
Tees, f.o.b. Glasgow.....	5	2	0	1.11

When European manufacturers realize the breath taking drop in American plates which has occurred since January (from 1.35 cents at Pittsburgh to 1.15

makers to demoralize their home market by cutting prices for Canada. Nevertheless, in the Montreal notes of a recent issue of *London Industries and Iron* it was stated that the Montreal Island Belt Line Railway Company (who propose building their road this year) are "said to have received an offer from the Carnegie mills to supply the necessary rails at \$20 per ton delivered in this city." Inquiry of the officers of the company showed that there was no foundation for the very improbable statement. English rails, however, could be laid down in Montreal at \$20 at present quotations, when river navigation opens. British trade returns show that 120,000 long tons of rails were sent to British North America in the calendar year 1893. This quantity would, of course, include the quantity sent to Newfoundland, in which colony there is now considerable activity in building lines to connect the extremities of the island and to give access to the coal and iron deposits of the interior. In Canada the consumption of rails in 1894 is not likely to be so large as in 1893. So far this year orders for upward of 24,000 tons of rails have been placed for Canadian roads.

THE WEEK.

The statement that the Pennsylvania Railroad Company is interested in the North River Bridge project, to connect New York and Jersey City, is officially denied. One of the principal Pennsylvania officials is quoted as saying that when the road enters New York it will be underground, not overhead.

The latest estimate of the mint bureau places the production of gold throughout the world in 1893 at \$150,000,000. In 1892 the production was \$138,860,000.

M. Bartissol's scheme for the carrying out of the Panama Canal project is said to include a plan for the cutting of a stone tunnel some six miles long through the high level of the canal. Into this the Chagres River is to be turned, and through sluices it is to be discharged into the excavated earth, the force of the stream being counted on to carry the earth off to the Pacific Ocean. Owing to the liability of the river to swell dangerously during freshets, the plan is, however, regarded by some engineers as impracticable.

Lack of rain has caused great distress in Southern California, where thousands of sheep are reported to have perished for want of pasture.

Thomas A. Edison and Col. E. Gouraud have applied to the Court of Chancery, Newark, N. J., for the appointment of a receiver for the Edison United Phonograph Company. The bill claims that the directors of the corporation have pursued a policy contrary to the views of the holders of one-half of the company's stock, which has resulted in the wasteful and injurious operation of the concern and caused its insolvency.

The magnificent new station of the Pennsylvania Railroad at Broad street, Philadelphia, is approaching completion. With its vast train shed and generally splendid appointments the station makes one of the finest railway terminals in existence.

The Philadelphia *Record* publishes a list of 25 "tramp" steamers which were obliged to leave that port in bal-

last during the first ten weeks of this year owing to inability to secure cargoes.

There is said to be a movement on foot among the paper manufacturers of the United States toward a great national combination, or pool, of all the mills.

About 100,000,000 feet of lumber has been cut in the Maine forests this winter, as compared with 130,000,000 feet a year ago. The lumbermen complain that the unprecedentedly mild weather of March has taken all the snow out of the woods and greatly hampered the hauling of the logs to the landing places. Consequently quantities of lumber will be held over for another year before reaching the market.

Terence V. Powderly has filed a claim against the executive board of the Knights of Labor for back salary as General Master Workman.

The Russo-German commercial treaty, recently arranged after much opposition, went into operation on the 20th inst. It is to remain in force for 10 years.

What is claimed to be the largest single stone ever quarried is said to have been taken recently from a quarry at Houghton Point, near Ashland, Wis. This monolith, of Lake Superior brown stone, is 115 feet long, and when completed is to be 10 feet square at the base and 4 feet square at the top. The apex will be about 5 feet long and tapered to a 6-inch tip. This obelisk is 10 feet longer than the largest of the Egyptian obelisks.

Trade Publications.

WE HAVE RECEIVED from the Cincinnati Milling Machine Company of Cincinnati, Ohio, a pamphlet very fully describing their new universal cutter and tool grinder. This machine is provided with all adjustment necessary to grind between centers work to 8 inches in diameter, but straight face cutters, metal slitting saws, inserted tooth mills, &c., can be ground up to 14 inches in diameter. It is also arranged for grinding cylindrical, conical and flat surfaces, such as hardened spindles, arbors, bushings, cam rollers, concave sides of cutters and saws and the face of punching dies, hardened gauges and templates. A great variety of small machine parts can also be finished to an advantage by grinding on this machine. It is perfectly universal and differs from other machines in the fact that it will grind any cutter and reamer without the use of special attachments, and that all work is done on a horizontal slide. Those familiar with grinding taper reamers, and the side teeth of side milling and angular cutters, are aware that the adjustment of the tooth rest is a difficult one, because the cutting edge of tooth to be ground must be exactly parallel with the line of slide. This difficulty is overcome in this machine. No attention is required to adjust the tooth rest, as it is centrally fixed for all diameters of cutters and reamers. In grinding work the tooth rest travels with the cutter, except when grinding spiral mills. It is made spring like acting as a pawl in a ratchet. This is a very positive and rapid way of passing to next tooth. The side teeth of angular and side milling cutters are ground off with a practically straight line clearance. This is done with a cup shaped emery wheel, 3 inches in diameter, on the left side of the machine. The advantage of grinding side teeth with a fair sized emery wheel, and at the same time grinding a straight line clearance with a corresponding strong cutting edge, is known to those who have heretofore been compelled to use a small wheel making a hollow clearance with a corresponding weak cutting edge. An important feature of this machine is this, that the table may be swung around on the column, and that the work can be brought into contact with the emery wheels on either side of the ma-

chine. Some of the advantages of this feature are as follows: Work may be brought into contact with wheels in the most favorable manner for rapid grinding without heating the cutter. Work may be ground more rapidly; for instance, a side milling cutter may have the top teeth ground off on the straight emery wheel on the right side of the machine, and the side teeth on the cup shaped wheel at the left side of the machine, without taking the cutter off the arbor or disturbing the tooth guide. Cutters of small diameter and sharp angles can be brought into contact with the emery wheel without the cutter, mandrel or centers striking the belt or head stock of the machine. In cylindrical grinding this feature permits the wheel to grind close up to a shoulder. In grinding the side teeth of side milling and angular cutters, a slight movement of the table around the column, changes the character of the cut from a sharp clearance for the stocking out between the teeth, to a slighter clearance for finishing the cutting edge without any danger of drawing the temper. This same feature permits the rapid adjustment of the machine from a simple cutter grinder to a surface grinder. The table is moved forward and back by means of a lever, which can be placed to suit the position or convenience of the operator. For the rapid adjustment of table toward the emery wheel, the holder carrying it slides on a shaft, while for the fine adjustment of grinding a screw is used. The table is elevated or lowered by means of a rack and pinion, and has a vertical adjustment of $3\frac{1}{4}$ inches. It is $20\frac{1}{4}$ inches long, has a horizontal movement of 12 inches, and will take in work between centers 15 inches long. Adjustable dogs for stops on each end are provided. The table makes a complete revolution on slide and may be set at any angle to 90°. As long as the table is parallel to the line of motion of slide, work ground will be straight without regard to its position as to emery wheel spindle. The work holder or swiveling head swivels both vertically and horizontally for clearance and for grinding work at an angle. All adjustments of table and swiveling head are indicated in degrees. The spindle is hardened and ground and runs in bronze bearings. It is provided with dust caps and adjustment for wear. It has but one speed. Endless belts may be used, as the spindle head may be moved up or down for adjusting them. A hand rest is furnished for turning off the emery wheels and grinding other work by hand. The countershaft furnished with this machine for driving the emery wheel spindle is complete, including a novel device for shifting the belt. The loose pulley is made smaller in diameter than the tight pulley to relieve the belt when machine is not being used. The pamphlet shows, by means of line engravings, the adjustment of the machine for grinding right and left hand angular mills, side milling cutters, metal slitting saws, gear cutters, straight and taper reamers, surface grinding, &c.

WE HAVE RECEIVED from the James Hunter Machine Company of North Adams, Mass., a catalogue which is divided into three parts. The first deals with power transmission machinery. This company make five different types of friction clutches. In class A the clutch mechanism is keyed to the shaft and the pulley revolves loose on the shaft. This class is used when it is desired to stop the shaft. In class B the clutch mechanism is a part of the pulley, and this is furnished when it is desirable to stop the pulley and allow the shaft to run. Class D is a disk friction well adapted to countershaft work and light running machinery. Classes E and F are built to meet the demands requiring friction clutches of large diameters, known as the rim clutch. The principal features of this clutch are that pressure is applied upon opposite sides of the rim at the same time, and the friction shoes are shod with hard wood. Pulleys, hangers, shafting, &c., also form part of this division of the catalogue. The second part is a price-list of this machinery, while the third part gives the dimensions.

Indications in the Lake Superior region point to the earliest opening of navigation on record. Everything of this character helps in the revival of business and in the employment of men who have long been idle.

The Iron Age

New York Thursday, March 29, 1894.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR.
CHAS. KIRCHHOFF, - - EDITOR.
GEO. W. COPE, - - ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS, - - HARDWARE EDITOR.
JOHN S. KING, - - BUSINESS MANAGER.

The Recovery of By-Products in Coking.

At last there is some assurance that Americans will be given an object lesson which may ultimately lead to stopping the frightful waste now going on in coke manufacture and will lead to the adoption of modern methods of coking. Americans are fully a generation behind manufacturers on the Continent, who could not cover a small fraction of the demands upon them if they depended upon the antediluvian beehive oven as the apparatus. We doubt whether any considerable quantity of decent coke could be made from French, German or Belgian coals in the oven which is now the standard in this country and in England. In other words, the definition of a coking coal in this country is a coal from which good coke can be produced in a beehive oven. Under that definition there is very little, if any, coking coal on the Continent.

A number of excuses may be offered for the retention of methods in this country which have long been known to be wasteful and crude. The Connellsville district, which has dominated the industry in this country, has held its own against all comers chiefly because of its exceptionally favorable position geographically, and because the cost of mining is exceedingly low. American furnacemen have been taught that its product possesses a physical structure eminently fitting it for a blast furnace fuel. Unless other coke possesses the same characteristics it is promptly condemned because it will not "carry the burden." And yet German iron masters make records for low fuel consumption with lean ores with coke whose looks would frighten an American furnaceman.

Progressive coke engineers on the Continent have long since realized that coal is a mixture of numerous hydrocarbons which act very differently under heat treatment. Every individual coal must be worked in a little different manner to obtain a product of maximum efficiency. The dimensions of the oven must be modified to suit each case. While that has been the course of thoughtful development abroad, American coke makers load any and every coal into the same oven. If the coke is not up to the arbitrarily fixed standard, so much the worse for the coal. The result has been that coke manufacture has been territorially restricted. This in turn has tended to localize iron manufacture and has ob-

structed the natural tendency of the industry to move toward the source of the ore.

Probably the most serious obstruction to progress has been the prejudice of furnacemen in favor of coke of special physical characteristics. We do not deny the value of the latter, but we do believe that their importance has been exaggerated. Still, for the coke manufacturer who sells in the open market it is a good deal easier to take the customer as he is than to attempt a costly and troublesome campaign of education.

It is therefore natural that the first effort in the direction of following advanced Continental practice should emanate from a consumer of coke. It is understood that the Johnson Company will introduce a method of coking with recovery and utilization of by-products. The fact that A. J. Moxham, one of the most progressive managers in this country, has taken that course, is an assurance that nothing will be spared to make it a success.

We believe that every American engineer who has investigated the subject in Germany and in Belgium—and there are quite a number of them—has become convinced that the quality and the increased yield of coke are more than an equivalent for increased cost of plant. There is no doubt as to the market for the ammoniacal liquor, and there is an important saving in labor through the utilization of the gas for raising steam.

The one important question which has been in doubt all along and which is still uncertain is the market for tar and the prices which can be realized for it when produced in very large quantities. The extension of by-product recovery in Germany has so seriously flooded the market for ammonia and tar there that benzole, the third by-product, has become the principal source of profit. One of the most important outlets for tar on the Continent has been in the manufacture of coal briquettes, or "patent fuel," a market which does not exist in this country. Those who have looked into the question carefully insist, however, that a revenue can be obtained from this source which will go to swell the balance sheet, which is favorable even without that accession to it.

To the iron and steel trades of the central West there is no more serious question than this. It means a permanent lowering in normal cost and a release from dependence upon our single coke producing district nearly controlled by a rival steel manufacturing interest.

The following illustration of the very low price of scrap iron has been furnished by a prominent Western dealer: He bought one lot of cheap grade which had to be hauled 500 miles and another 775 miles, for which he paid only \$3 per gross ton delivered. Those who delight in solving knotty problems

can figure for themselves what this probably netted the seller after paying transportation charges.

American Manufacturers and the World's Markets.

The low prices for some lines of iron and steel products are encouraging a good deal of premature talk concerning the capacity of our manufacturers to invade the world's markets as sellers. We are sure that few Americans familiar with our resources and our methods are not convinced that the manifest destiny of the United States is to become the greatest manufacturing country in the world. What we have accomplished in some branches of agriculture and of industry is merely a forerunner of the great achievements which the next generation will bring. It is pleasant to be prophetic in that direction, but it is very dangerous to be premature. We hear enthusiasts exultingly proclaim that soon we shall be able to build ships for the open seas because, temporarily, ship plates and angles are selling on the Atlantic seaboard very close to the figures which prevail in Glasgow, Belfast or on the Clyde. But the fact is overlooked that even if this did help us now, it avails us nothing for some time to come, because the conditions upon which hasty prophets base such visionary dreams are merely temporary. Our present period of depression and ruinous prices must be followed by a recovery which will carry values far above the present level and afford some fair remuneration to capital and labor. We do believe, however, since every succeeding decline has taken us below its predecessor, that the drop which will follow our next rise will land us on a parity with the international market. Then we shall have attained what friends of American industries have always held out as the goal at which their policy has aimed, the complete control of our markets and a splendid fighting chance for the mastery of the business of other countries. While we hold that it is foolish to expect the realization of these hopes in the near future, we do believe that with modern rapid development it will come earlier than the more conservative are inclined to acknowledge.

There are many obstacles in the way. We must gradually accumulate greater banking facilities and be prepared to give more liberal credits. We must, in the interval, put an end to our disgraceful system of appointing foreign consular agents and develop a service approaching in efficiency that of the leading foreign nations. Our bright young business men must begin to look outside of their own country for a successful career, and our manufacturers must through study and travel learn the wants and methods of foreign customers. The time for active preparatory work is upon us. It should be persistently and intelligently pursued even during the time

soon approaching when chances in the world's markets will look less auspicious than they may appear now.

The Recent Freight Reductions.

Western manufacturers are by no means satisfied with the present status of the freight question. The reductions that have been made are in line with their general views, but so far these reductions have merely projected additional elements of disturbance into a badly demoralized situation. The manufacturers of Western Pennsylvania and Eastern Ohio have been graciously accorded rates to Western points which are lower than anything ever before known except for a very brief period some 12 years since when a fierce freight war raged. These rates are now so low, in fact, that they bear some relation to the unprecedentedly low prices of iron and steel. But while the interests of one section of the country have been thus assisted, it has been to some extent at the expense of the interests of another section. The manufacturers further west have been subjected to greatly increased competition in their markets from the manufacturers of Western Pennsylvania and Ohio. The reduction in freight rates has been partial and not general, as it should have been.

A serious injustice to Chicago and Milwaukee manufacturers is the failure to revise the freight rates on coke to correspond with the new rates on pig iron and finished iron and steel hauled over identically the same railroads. This is a rank discrimination against some of their patrons which cannot be defended by the railroad companies with any show of reason. They may allege that the reductions in rates thus far made are not intended to be permanent, and they are even now industriously circulating rumors that the old schedules will be restored in a very short time, but the chances are against such restoration as long as freight traffic is light. The opening of lake navigation is also close at hand, and water transportation will be cheaper than ever, so that rail rates in the lake territory must be kept down to secure a fair share of the summer traffic. The opinion therefore prevails that railroad managers will not be able to again advance rates until the condition of general business has radically improved. But even if such reductions as are now in effect on finished products should be made for but a limited period, it would only be fair to lower the rates on coke for the same period.

Discrimination is also made against the manufacturers of Indiana and Illinois in another important particular. Through rates have been heavily reduced on finished iron and steel from Western Pennsylvania and Ohio to Mississippi and Missouri River points, while the local rates from Indiana and Illinois mills have been very slightly

cut from the old figures. An illustration will be given. The *pro rata* of the roads running west from Chicago, it appears, is 37 per cent on business originating at Pittsburgh and billed to Mississippi River points. They receive 5½ cents per 100 pounds for their part of the haul on bar iron and other products in the same classification. If, however, the business originates in Chicago, these same roads charge 8½ cents per 100 pounds. The same train, therefore, hauled by the same engine, will transport Pittsburgh iron or steel from Chicago to Dubuque, Clinton, Moline, Rock Island or Davenport for a trifle more than half the cost of transporting Chicago iron or steel. The Indiana mills suffer in the same way. Advantages of geographical position are thus neutralized.

But the whole story has not yet been told. Recently the rates on bar iron and other iron and steel in the same classification were reduced slightly from Chicago to St. Paul and Minneapolis, after a long contention by the Chicago manufacturers. When they sought to take advantage of the new rates they found that a curious proviso had been inserted by some official of the freight committee fixing the minimum for carloads at 40,000 pounds. This almost completely nullifies the expected benefit of the lower rates, because carloads of bar iron, steel, nails or wire usually run from 20,000 to 24,000 pounds, and buyers are not disposed to increase their purchases so considerably merely to favor Chicago manufacturers with their business. The scrap dealers of the Northern Mississippi valley are injuriously affected by this discrimination against Chicago, which is their natural market. Whatever restricts the business of Chicago manufacturers or reduces Chicago prices of finished products also restricts the demand for Western scrap or reduces its price.

It will be seen from this statement of facts that a complete overhauling of freight schedules is needed in the West to place all manufacturers on an even footing. As matters now stand there is an irregularity which should not exist. The manufacturers of no section should be given advantages over the manufacturers of other sections. Fair play cannot be objected to by any reasonable man. The subject is one demanding immediate attention and correction.

A dispatch from Auburn, N. Y., mentions a gratifying revival of trade in that district. As an illustration of the improvement, it is stated that two trains have recently left Auburn for the New England States, carrying 81 carloads of agricultural implements, the largest consignments ever sent in response to orders.

London advices state that the constructors of the "Lucania" and "Campania" have been engaged to build two or more fast Atlantic steamers of 10,500 tons, to run between Liverpool and Canada.

Washington News.

(From our Special Correspondent.)

WASHINGTON, D. C., March 27, 1894.

The Tariff Situation.

On next Monday the tariff bill reported from the Committee on Finance will begin its parliamentary career. When it will terminate no one can tell. The present disposition is to give the bill a most thorough consideration. It is more than probable that when the disagreements which exist in the ranks of the majority begin to take definite shape a motion to recommit may send it back to the committee.

If the measure comes to that point it is not likely to get back to the Senate during the present Congress.

Out of the million or more of circulars of inquiry sent out to all classes of manufacturers, labor organizations, importers, &c., that relating to the metal schedule having been published exclusively and in full in *The Iron Age*, but about 80,000 replies in letters and statements have been received from all sources.

Of this number not more than 1600 contain information, and of these but a small proportion are of any practical value.

What data has been received is being collated and will be utilized in the discussion of the bill in the Senate. The majority, who were supposed to be at the bottom of the project to obtain information from the industries interested and affected by the proposed bill, appear to have given the accumulated results no attention. The information does not suit their purposes. The minority, however, are putting the information in shape and will utilize it in the course of the discussion.

It was given out by the majority that these circulars of inquiry were to take the place of hearings, but no use having been made of them simply points the deception practiced upon industry and labor. The debate in the Senate is likely to bring out some interesting and novel features in the way of revising a bill which affects every industrial interest in the country.

The Armor Frauds.

The voluminous details of the history of the alleged violation of the contracts of Carnegie, Phipps & Co. with the United States Government for the manufacture of armor plate for the United States navy and the discovery of the irregularities have been submitted to Congress under the resolution introduced in the House some days ago by Representative Cummings of New York.

The report submitted by Secretary Herbert shows that the informers were employees of the company and were willing to lay the facts before the Government for a consideration in money. The Government having the power to contract as proposed, 25 per cent. of the amount recovered was to be paid. The men produced information in great detail.

The charge was that the company had failed to temper armor properly or evenly, had plugged and concealed blow holes, and had retreated plates which had been selected for the ballistic tests so that they were of higher standard than the group which they represented, and that the annealing and retempering was done at night. The telltale slips of paper showing the length of time each plate had been subjected to the heating and annealing processes which were

handed in by the heaters showed from the pencil marks that they had been altered. It was supposed that these had been destroyed. The investigation, under the direction of Commodore Sampson, chief of the Bureau of Ordnance, U. S. N., sustained the charge that the test plates had been plugged and retreated, whereupon the Department assessed damages at 15 per cent. on the amount of armor delivered and all premiums received. The period for which damages were to be paid was for armor plate manufactured between November 3, 1892, and September 16, 1893. The Secretary's decision, with the acquiescence of the Department, having been appealed to the President, the amount of damages was reduced to 10 per cent. The President in his letter, January 10, 1894, to the Secretary of the Navy, after reasoning upon the irregularities, says: "I am satisfied that a large portion of the armor supplied was not of the quality which would have been produced if all possible care and skill had been exercised in its construction. I am of the opinion that under the terms of the contract between the Government and the company this constituted a default entitling the Government to damages."

"It is, however, an exceedingly difficult matter to extract from the facts developed a satisfactory basis for the assessment of such damages; and, inasmuch as my decision of the matter is final, I am naturally anxious to do justice to the company and to avoid presumptions against it not fully warranted."

He adds: "I am willing to assume that the faulty construction began on November 3, 1892, and was corrected on September 16, 1893. On all the armor manufactured for the Government between these dates, I think 10 per cent. from the price should be deducted."

The amount manufactured during the period named is 2,647,937 pounds, valued at \$1,404,894, 10 per cent. of which would make the amount of damages assessed by the President \$140,489. The Department has issued most rigid regulations for the government of the work of this company in the future.

The effect of this occurrence, whether the company's directors have been involved or not, has already been to throw discredit upon their work generally.

The 13-Inch Gun.

The Congressional junket arranged for witnessing the test, at the Indian Head Proving Grounds, of the first of the 12 13-inch breech loading rifled guns for the four battle ships was an unqualified success. The House of Representatives adjourned and the Senate Chamber was almost depopulated in honor of the event. The military and naval *attachés* of embassies and legations, foreign ministers and high officials were also present, which indicated the interest taken in the affair. The dispatch boat "Dolphin" and ordnance tug "Triton" had as many guests as they could well accommodate. The day was exceptionally fine. The conditions, therefore, for the comfort and convenience of humanity, as well as for the best results from the mighty piece of ordnance, were very satisfactory. Commodore Sampson, chief of the Ordnance Bureau, United States Navy, was in general charge. Lieut. N. E. Mason, United States Naval Inspector of Ordnance, was in charge of the firing, assisted by Ensign Tisdale. Ensign Jenkins was in immediate charge of the chronographs. A technical description of the gun was given in a previous

letter. The following are the official results of the firing:

Gun, B. L. R., 13 inch; full charge, 550 pounds; weight of projectile, 1100 pounds. Four shots fired.

Charges used. Weight, pounds.	Pressure, 3 gauges, mean. Tons.	Velocity. 3 chrono- graphs, muzzle. Feet seconds.
461	12.3	1,851
526	17.1	2,003
403	10.2	1,720
482	14.8	1,975

Powder used, grains, hexagonal prisms, 11½ to the pound. On the second round there was not sufficient velocity for the amount of pressure. The muzzle velocity to be attained is 2100 f. s., which can be remedied in the powder. In speaking of the question of powder ordnance, Inspector Mason mentioned some very interesting points: "In old fashioned ordnance the subject of powder was not so important. The scientific construction and accuracy of the guns was not then anything compared with those of modern design. Each gun must now have its particular powder. For instance, the powder for a 6-inch gun would burst a 13-inch. It would produce at least 25 tons pressure, and would act so quickly that the shell would never leave the gun. The gun itself would be more likely to go to pieces. The powder we used to-day was the first of the kind ever made in the United States and very fair." Commodore Sampson said: "The gun itself came entirely up to expectations." One of the peculiarities was a coating of residuum, largely alkali, which was found in the gun and came off in flakes from ¼ to ½ inch thick. It is said in firing in damp weather the smoke of the powder eats off the paint on the ship wherever it settles.

An interesting experiment was made with smokeless powder in a 4-inch gun. There was a brilliant flash and a very thin black smoke, but not sufficient to obscure the gun or the object aimed at.

OBITUARY.

JOHN M'CLYMONDS.

John McClymonds, who died at Cleveland, Ohio, March 13, 1894, was closely identified with a number of manufacturing enterprises, notably that of rubber goods. He founded the Cleveland Rubber Company in 1870, and was their president until succeeded by his son, L. K. McClymonds, now general manager of the Mechanical Rubber Company. At the time of his death Mr. McClymonds was a director of the Mechanical Rubber Company, in the organization of which he took an active part. The greatest part of his life has, however, been devoted to the banking business. In 1840 he became manager of the Columbia branch of the State Bank at New Lisbon, Ohio. In later years he was one of the organizers of the Union National Bank of Massillon, Ohio, and also of the Ohio National Bank of Cleveland. He served as president of the latter until his retirement from active business a few years ago. He was 86 years of age. His life was one of remarkable activity and success, and he died possessing the respect of all who knew him. His burial occurred at Lakeview, March 15.

GEORGE H. GOODSSELL.

George H. Goodsell, manager of the Leechburg mill of Jennings Bros. & Co., Limited, Pittsburgh, is dead at the age of 52 years.

PERSONAL.

Among the candidates for membership of the American Society of Mechanical Engineers are A. H. Blackburn of the Fuel Economizer Company, Matteawan; F. H. Brewster of the Birmingham Iron Foundry, Derby, Conn.; W. C. Coffin of Riter & Conley, Pittsburgh, Pa.; B. K. Field, vice-president of the Berlin Iron Bridge Company; John Konesi of the Schenectady works of the General Electric Company; Frank J. Logan of the Logan Iron Works, Brooklyn; Thomas J. Rider of Erie, Pa.; Leonard Waldo of the Waldo Foundry, Bridgeport, Conn.; J. K. Wright of the Wright Steam Engine Works, Newburg, N. Y., and Charles B. and George Rowland of the Continental Iron Works, Brooklyn.

John Walker, founder of the Walker Mfg. Company of Cleveland, has accepted the position of general manager of Fraser & Chalmers of Chicago and London. Mr. Walker has more than national reputation as an inventor and engineer, though his chief efforts during the past few years have been in the designing and construction of heavy machinery for cable roads, both in this country and abroad, having invented many of the greatest improvements in cable work. He is a member of the Royal Engineers' Society of London and most of the engineering societies in this country, and is also commander-general in the United States of the Knights of the Sons of St. George.

The Canadian Tariff.

Since the receipt of the "Canadian Notes" from an occasional correspondent, printed elsewhere, dispatches from Canada report the details of the budget speech, in which the following changes are reported on the duties on iron and steel:

In the class of metals, Mr. Foster said that iron, the chief article, had received special consideration. Scrap iron, raw material, hitherto at \$2 per ton, was being injuriously used in the manufacture of iron where better material should be used. The Government had decided to keep pig iron on the same duty, at \$4 per net ton, and the same bounty, \$2 per ton, as hitherto. But the difficulty of meeting the trouble with the cheap scrap iron was met by increasing the present duty of \$2 per ton on scrap to \$3, up to January 1, 1895, and to \$4 thereafter. But the duty on bar iron was reduced to \$10 per ton from \$13, and puddle bar to \$5 from \$9. To encourage the manufacture of puddle bar in Canadian blast furnaces from pig iron, a bonus of \$2 per ton would be given for five years.

Forgings of iron and steel are put at 35 per cent. Steel rails for steam railways are free; for electric or other railways, 30 per cent. if less than 25 pounds per yard in weight. Nails are changed to 30 per cent. from 1½ cents per pound.

Wood screws are down to 3, 6 and 8 cents per pound, a reduction of about one-half. All other screws, steel or iron, to 30 per cent. from 35 per cent. House furnishing hardware, all at 32½ per cent.; hatchets, mattocks, picks, &c., to 30 per cent. from 35 per cent. Axes, lawn mowers, &c., 35 per cent. ad valorem. Shovels and spades, 35 per cent. Surgical and dental instruments to 15 per cent. from 20 per cent. Railway locomotives to 35 per cent.,

straight, instead of 30 per cent. Agricultural implements were next taken up. The general duty has been 35 per cent. A strong demand has been made on the Government for reduction or removal. These machines were made largely of iron, and the reductions made by the Government on iron would apply on these, but the Government had also decided to cut the general duty of 35 per cent. down to 20 per cent., which would tax the Canadian factories pretty seriously to meet outside competition. The reduction took in mowing machines, horse rakes, harvesters, reapers, plows, binding attachments and all such machines.

Sewing machines were made 30 per cent. instead of \$3 per machine and 20 per cent. Barbed wire is reduced to $\frac{3}{4}$ cent per pound from $1\frac{1}{4}$ cents. Brass and copper wire to 10 from 15 per cent. As a concession to makers of wire fencing their wire is reduced to 15 per cent. from 25 per cent. Coke, now 50 cents per ton, is made free. Electric apparatus is put at 25 per cent.

Cupola Heat and Quality of Cast Iron *

W. J. KEEP, DETROIT.

The statement was made some weeks ago that a casting made at the last part of a heat was stronger than if made at the first part. An analysis proved that the iron from the early part of the heat contained 2.80 per cent. of silicon while that from the last carried 2.70 per cent. This would not account for any variation in strength. We are apt to jump at conclusions. It has generally been stated that as the cupola became hotter the iron would contain more silicon, but this analysis and those which I shall present both show this to be an error. This is also a case where we are deceived by the fracture, for the grain of the casting made early in the heat is closer and lighter in color than that made later on. We shall prove that the difference is caused by the variation in heat at which the iron was melted, not the heat of the iron when it was put into the mold.

When a cupola begins to melt, everything is comparatively cold. There is no slag and the blast has free access to all parts of the cupola. The drops of melted iron are exposed to this cold blast as they fall among lumps of fuel and on the sand bottom, all of which are colder than the fluid metal. The first iron drawn from a cupola has been melted under such conditions, but in half an hour the melted iron is covered with a protecting slag and the heat increases until the blast is off. The following series of tests are each averages of from three to six test bars, made at various times, to determine the influence of varying heat. In each case the first set of test bars was poured from the first iron after about 400 pounds had been taken. The last was in each case taken after the wind was off, and just as slag began to show at the tapping hole. The intermediate tests were taken at regular intervals, the heat lasting about $3\frac{1}{2}$ hours. In some cases, therefore, a test was taken every 20 minutes, and in others they were over an hour apart. In series IX, X and XI the tests were about one hour apart. Two things are evident: There is no

uniform variation in strength. There is in each case a decrease in shrinkage and chill.

In calculating the mixture of the pig iron alone I used analyses which I have of each iron used. To arrive at

Tests of Iron During the Melt.

Number series.	Number test.	Number tests in each heat.	Dead load.		Impact.		Shrinkage.		Chill.
			Strength.	Def.	Strength.	Def.	Square.	Flat.	
Series I.	271	First set.....	353	0.19	322	.....	0.158	0.163	0.10
	272	Second set.....	365	0.21	314	.....	0.129	0.148	0.10
	272½	Third set.....	373	0.23	347	.....	0.133	0.150	0.10
	273	Fourth set.....	371	0.22	371	.....	0.124	0.146	0.07
	274	Fifth set.....	412	0.26	382	.....	0.123	0.148	0.05
	275	Sixth set.....	442	0.26	356	.....	0.124	0.140	0.02
Series II.	222	First set.....	331	0.21	254	.....	0.183	0.197	0.25
	223	Second set.....	378	0.21	296	.....	0.168	0.157	0.05
	224	Third set.....	360	0.20	271	.....	0.177	0.170	0.05
	225	Fourth set.....	343	0.20	263	.....	0.175	0.189	0.09
	226	Fifth set.....	355	0.20	238	.....	0.164	0.184	0.08
	227	Sixth set.....	369	0.21	314	.....	0.164	0.181	0.10
	228	Seventh set.....	372	0.22	238	.....	0.182	0.180	0.10
	242	Eighth set.....	313	0.17	246	.....	0.173	0.168	0.15
Series III.	276	First set.....	415	0.22	322	.....	0.167	0.168	0.15
	277	Second set.....	390	0.22	322	.....	0.157	0.159	0.10
	278	Third set.....	351	0.19	296	.....	0.155	0.154	0.05
	279	Fourth set.....	368	.....	322	.....	0.159	0.146	0.10
	280	Fifth set.....	355	0.20	264	.....	0.153	0.156	0.15
	281	Sixth set.....	390	0.23	245	.....	0.145	0.152	0.10
	282	Seventh set.....	381	0.22	314	.....	0.158	0.158	0.06
	283	Eighth set.....	380	0.22	305	.....	0.148	0.153	0.03
	284	Ninth set.....	381	0.21	331	.....	0.130	0.148	0.20
Series IV.	311	First set.....	402	0.22	313	.....	0.160	0.168	0.15
	312	Second set.....	366	0.20	330	.....	0.139	0.153	0.15
	313	Third set.....	387	0.22	280	.....	0.133	0.150	0.08
	314	Fourth set.....	332	0.21	339	.....	0.138	0.150	0.08
	315	Fifth set.....	365	0.20	347	.....	0.132	0.148	0.10
Series V.	316	First set.....	354	0.19	288	.....	0.158	0.159	0.06
	317	Second set.....	395	0.22	314	.....	0.143	0.150	0.12
	318	Third set.....	393	0.23	296	.....	0.181	0.147	0.08
	319	Fourth set.....	403	0.25	313	.....	0.131	0.147	0.04
	320	Fifth set.....	388	0.21	305	.....	0.129	0.147	0.06
	321	Sixth set.....	399	0.22	.....	.....	0.134	0.142	0.09
Series VI.	322	First set.....	350	0.20	305	.....	0.154	0.156	0.07
	323	Second set.....	333	0.19	245	.....	0.150	0.154	0.05
	324	Third set.....	336	0.18	288	.....	0.138	0.152	0.10
Series VII.	325	First set.....	353	0.19	296	0.161	0.161	0.165	0.16
	326	Second set.....	363	0.21	314	.....	0.145	0.149	0.07
	327	Third set.....	333	0.20	288	.....	0.154	0.154	0.08
Series VIII.	336	First set.....	360	0.18	283	.....	0.156	0.162	0.10
	337	Second set.....	378	0.22	296	.....	0.142	0.150	0.08
	338	Third set.....	348	0.20	321	.....	0.142	0.152	0.07
Series IX.	788	First set.....	373	0.21	263	0.20	0.163	0.162	0.15
	789	Second set.....	369	0.21	280	0.21	0.137	0.147	0.04
	790	Third set.....	397	0.21	297	0.22	0.130	0.141	0.05
	791	Fourth set.....	398	0.22	338	0.25	0.121	0.141	0.07
Series X.	795	First set.....	431	0.22	373	0.24	0.158	0.165	0.08
	796	Second set.....	429	0.23	432	0.26	0.132	0.144	0.03
	797	Third set.....	443	0.23	424	0.26	0.126	0.140	0.03
	798	Fourth set.....	396	0.23	297	0.22	0.132	0.144	0.06
Series XI.	799	First set.....	415	0.23	373	0.24	0.159	0.165	0.07
	800	Second set.....	453	0.23	382	0.24	0.136	0.148	0.01
	801	Third set.....	455	0.25	398	0.25	0.130	0.141	0.05
	802	Fourth set.....	479	0.27	415	0.25	0.125	0.140	0.06

To reduce the strength of these test bars to a bar 1 inch square and 12 inches long multiply by eight. Each of the above tests (a set) consisted of five test bars $\frac{1}{2}$ inch square and 12 inches long, and a companion flat bar 1 inch wide, 1-10 inch thick and 12 inches long. Three square bars are broken in a special autographic dead load testing machine, and two square bars are broken in an autographic impact testing machine. Only averages are recorded.

The following analyses by Cary & Moore were of the bars 788 and 791, series IX: the regular mixture 40 per cent. of remelt is added, and deductions are made for loss of carbon and silicon, and addi-

Number test.		Total carbon.	Graphite.	Combined carbon.	Silicon.	Sulphur.	Phosphorus.	Manganese.
788	Actual analysis of test bars.....	2.910	2.280	0.630	3.220	1.025	0.123	0.49
791	Actual analysis of test bars.....	2.950	2.470	0.480	3.140	1.055	0.100	0.47
791	Calculated composition of mixture.....	2.476	2.110	0.366	3.130	0.911	0.078	0.450
791	Calculated composition of pigs alone.....	2.540	2.181	0.359	3.186	0.902	0.064	0.456

* A paper read before the Western Foundrymen's Association.

tions for the gain of phosphorus and sulphur, which are expected to take place. Evidently the pig iron is higher in carbon and phosphorus than the original analyses show, and more sulphur has been taken from the fuel than I calculated for. I did not figure on cumulative percentage of sulphur, which this and previous analyses indicate should be figured where a large portion of remelt is returned to the cupola each day. Since writing the above I have received four sulphur determinations of other tests of this same mixture, but made on other days, and the average of the four is 0.081, showing that the day that series IX was made a car of coke was used with the sulphur higher than usual.

It will be noticed that the tests for series IX show less strength than those of series X and XI. The reason for this is that each test in series IX was poured as soon as the iron was taken from the cupola, while in making series X and XI the molders poured other work from the ladle and then used the last iron for the test bars. Iron grows stronger as it stands in the ladle. To show this fact more clearly the following four tests were poured from a single ladle with 28 pounds of iron, the tests being poured one minute apart, or three and one-half minutes from the first to the last. Between times the ladle rested so that the iron could cool, but the iron was not agitated:

Number test.	Series XII.	Dead load.		Impact.		Shrinkage.		Chill.
		Strength.	Def.	Strength.	Def.	Square.	Flat.	
784	First test.....	388	0.23	348	0.24	0.128	0.143	0.02
785	Second test.....	393	0.21	331	0.23	0.128	0.140	0.02
786	Third test.....	424	0.21	406	0.25	0.128	0.135	0.025
787	Fourth test.....	466	0.24	347	0.24	0.129	0.136	0.02

The iron of series IX being poured immediately after it was caught corresponds to test 784 of series XII, while those of series X and XI are more like 786 and 787.

Cary & Moore found the silicon of test 784 to be 3.46 and the sulphur 0.079, while test 787 has silicon 3.45 and sulphur 0.083. You will notice that the shrinkage and chill of the square test bars do not change, though the more sensitive flat test bars show some decrease. The difference in strength in this case is in no way occasioned by change in chemical composition, but is no doubt due to the internal stress in the first test bar (784) caused by a rigid shell forming about very hot metal, which latter in shrinking causes a stress between the grains, while the last test bars (787) are so cold that the metal at the center does not shrink much. The difference in strength is therefore due to the physical structure.

Now recurring to the analyses of 788 and 791, we should not be too sure as to indications without other analyses of other tests. But the similarity between these silicons and the silicons (7.80 and 7.70 per cent.) first referred to lead us to expect similar results again. The indication is that the carbon burned out slightly before the slag covered the iron, and it is quite certain that we get all the silicon in the casting while the cupola is cold, but that it was burned out somewhat after the cupola became hot. Also it is evident that less sul-

phur is taken up in a hot than in a cold cupola.

The combined carbon is slightly greater in the iron having the most silicon, showing that the increase in combined carbon is due to the conditions in the cupola, and not to chemical composition. The increased chill is also due to these conditions and not to combined carbon or to sulphur.

Chill is probably a union of carbon and silicon and iron under a peculiar cooling influence, and is not the same thing as the determined combined carbon. With the cooling conditions present at the beginning of this heat, the iron is in such a state that it will take a chill, and often such iron as 788 will solidify with the exterior surface a soft gray, while the interior will be a perfectly white core, the silicon being the same in both. Iron that favors a white core comes at the beginning of the heat when silicon is high, but it is a rare thing to get the conditions that will cause it. As soon as the cupola is hot, half an hour after the iron comes down, such a union cannot be formed.

In tests of pig iron it is difficult to trace chill to the influence of combined carbon, or to any other element. We might perhaps compare the conditions existing when the test bars 788 were made to a blast furnace with cold blast, which makes a chilling iron. The conditions afterward are a little more like a furnace with hot blast, which makes an iron with less chill. The question of

in the physical characteristics, but we shall, at another time, prove that this is not so. The change is chiefly if not wholly due to physical effects, brought about by the change in heat in the cupola. Very great changes in strength can be obtained by manipulation. From this same mixture I obtained the strong test bar which has been referred to, by simply a slight agitation of the metal in the ladle with a steel bar for 30 seconds. These tests illustrate the sensitiveness of a $\frac{1}{2}$ -inch test bar, which by its variations in shrinkage will indicate the exact influence of each chemical element in the iron, and is the most sure method of controlling a foundry mixture.

I will say only a word regarding the papers introduced at the last meeting. I am not in any way opposed to chemical work; I could do nothing without it. None of the conclusions of this paper could have been reached until the full analyses of the test bars were received. Chemistry alone has made little progress in the study of cast iron, and many of its conclusions have been wrong. With the ordinary large test bar physical tests have taught but little. With a small sensitive test bar, by the help of chemical analysis, very much has been done. What I claim is that a laboratory in an ordinary gray iron foundry, with a chemist such as would naturally be employed, would accomplish less than could be done through the use of the $\frac{1}{2}$ -inch test bar alone. The manner in which some founders use a little chemical data is very discouraging. I fully agree that each founder should have a thorough chemical education, but they should acquire the habit of using it in a practical way. For example, Mr. Wheeler proposed a theory that all iron coming from a furnace contained an equal amount of sulphur and that the more fluid No. 1 iron allowed its sulphur to escape, &c. Now, he has the iron running each day, and has a laboratory. Why should he, of all others, theorize regarding sulphur when he could prove it and thereby add to the general knowledge?

Mr. West claims to have a laboratory, and yet in a letter to the *Iron Trade Review*, February 22, 1894, ascribes the variation in strength which is the subject of this paper to the variation in the metal charged, claims that his records show more silicon in a hot cupola and then reasons from this fact. If such men jump at conclusions with a fully equipped laboratory at their command, it is discouraging for others to begin their use.

Mr. Bolland theorizes regarding chemistry, with which he owns he is not very familiar, and then says that personally he found no trouble in controlling his mixture by test bars. This personal experience of a practical founder is worth more than all that he imagines could be done.

Rogers, Brown & Co., whose various offices are located at Cincinnati, Buffalo, Chicago, St. Louis, Philadelphia, New York and Boston, and who made an exhibit at the World's Fair, have received notice that they have been awarded a medal and diploma for a collective exhibit of pig iron. Their display comprised samples of every kind of iron manufactured in the United States except pure anthracite, and from every State in the Union which produces pig iron. Their Niagara brand was a prominent feature of the exhibit.

MANUFACTURING.

Iron and Steel.

R. G. Sykes of the Sykes Iron & Steel Roofing Company, Niles, Ohio, has made a proposition to the citizens of that place, agreeing to build a rolling mill and two sheet mills, with all necessary buildings, machinery and appliances to operate the same, and requiring 75 men to operate sheet mill, within six months from April 1, 1894. The company to be incorporated with a capital stock of \$100,000, one-half of which shall be paid up immediately, provided that the council of Niles issue city bonds to the said Sykes in the sum of \$10,000, which the said Sykes agrees to take at no less than par value. The proposition of Mr. Sykes was accepted by the council of Niles, and it is probable that work on the new mill will be commenced within a short time.

A number of colored puddlers in the employ of the Clinton Iron & Steel Company, at Pittsburgh, have returned to work at \$3.25 per ton for boiling.

The Beaver Falls Mills of the Carnegie Steel Company, Limited, at Beaver Falls, Pa., which have been idle for several weeks, resumed operations on Monday, the 26th inst. The product at the above plant consists of wire nails and wire rods exclusively.

The Cleveland City Forge & Iron Company, Cleveland, Ohio, have just completed the forging of a shaft weighing about 42 tons. It is 40 feet long and 24½ inches in diameter. The same firm have taken the contract for making the large rudder frames for the United States war ships "Iowa" and "Brooklyn," now being built by Wm. Cramp & Sons of Philadelphia, Pa.

The Crawford Iron & Steel Company, a corporation existing for some 12 years at New Castle, Pa., which firm operated Neshanno-k furnace at that place, have been formally dissolved. The concern had a capital stock of \$150,000, the officials being Wm. Patterson, president; James A. Crawford, secretary and treasurer, and W. E. Reis, manager. Last year Neshanno-k furnace was sold to the Shenango Valley Steel Company, which is the reason for the dissolution of the Crawford Iron & Steel Company.

The citizens of Burlington, Iowa, have for some time been disturbed by rumors of the removal of the rolling mill located in that city. This rumor is confirmed by news from Tacoma, Wash., stating that negotiations are in progress which will result in the removal of the works there. The plant is worth \$175,000, occupies 48 acres of ground, and employs 400 men. It has been closed eight months owing to business depression and overproduction in the East. The owners canvassed Pacific coast cities for a suitable site where iron is in demand, and Tacoma was selected. It is understood that a bonus of \$35,000 and expenses for removal will be paid. A number of Tacoma capitalists are interested.

A press dispatch from Montpelier, Ind., dated March 19, says that contracts were made with Mr. Calbe of St. Louis for the location of an eight mill tin plate works which will employ 500 men, covering five acres of ground, and will require ten brick and iron buildings. Work on the factory will begin immediately, and every effort will be made to have it in operation by September next.

Work on the construction of the Irondale rolling mills is in active progress at Middletown, Ind. Under the first site selected a bed of quicksand was discovered, which necessitated a change of location about 200 feet east, where solid ground was found. It is proposed to have the mills in operation by July 1.

The Valentine Iron Company of Bellefonte, Pa., have published another "Nitanny Bulletin," in which they announce that their furnace will be blown in about April 2.

The Edgar Thompson Steel Works, at Bessemer, Pa., returned to the manufacture of billets last week. It is understood that very few rail orders are on hand, and the plant will likely continue on billets for some time.

The largest ingot ever cast at the Homestead Steel Works, Homestead, Pa., was turned out last week and weighed 175,000 pounds. The large press recently imported

from England for the armor plate department of this plant was recently put in operation, and is said to work in a very satisfactory manner. It has a pressure of 10,000 pounds to the square inch.

The Canonsburg Iron & Steel Company of Pittsburgh are erecting an addition to their plant at Canonsburg, Pa., in the shape of an iron building 75 x 100 feet in size. It will contain a three-high and also a regular two-high bar mill of the latest improved design and adapted to rolling sheet bars to accurate gauge, and especially tin plate bars. This bar mill will be fitted up with a 28 x 60-inch Corliss engine of 500 horse-power, together with the necessary boiler capacity. The mill will probably be completed about June 1. The company have completed their wash house, and expect to commence making tin and terne plates at once.

Mary furnace of the Ohio Iron & Steel Company, at Lowellville, Ohio, blew in on March 26, for the purpose, it is said, of filling an order for 30,000 tons of Bessemer pig iron.

The Kansas City Steel & Iron Works is the name of a new concern that has filed articles of incorporation at Kansas City, Mo. The capital stock is \$350,000, of which one-half is said to be paid in. The object of the company is the manufacture of steel, iron, brass and copper.

George W. Jaques, late of the firm of A. A. Thomson & Co., New York, has set up in business as a manufacturer of tin and terne plates. Mr. Jaques' works are on Thirteenth avenue, between Twentieth and Twenty-first streets. Two tinning machines are now in operation, and two more are to be added. The machines are of the pattern recently patented by Mr. Jaques, and are said to operate very satisfactorily.

The works of the Troy, N. Y., Steel & Iron Company have ceased operations again, having been running since the first week in March. One of the mills of the Rensselaer Iron Works is running to use up the stock produced by the Bessemer plant while in operation, but this mill, it is said, will only be in operation for a brief period.

The S. R. Smythe Company, engineers and contractors, Lewis Block, Pittsburgh, Pa., have just completed their third contract with the Lukens Iron & Steel Company, Coatesville, Pa. This contract included the erection of additional horizontal heating furnaces and a number of the Smythe improved soaking pit furnaces. These furnaces are said to be of novel design, having a number of improvements which enable them to give excellent results in heating, durability, &c. Additional gas producers were also erected to run the above furnaces. These improvements give the Lukens Iron & Steel Company one of the most complete plate and sheet mills in the country, and also considerably increase their output. The S. R. Smythe Company have also recently completed the erection of a second tube mill for the Tyler Tube & Pipe Company, Washington, Pa., which doubles the capacity of that concern in the manufacture of Tyler boiler tubes, for which the firm report an excellent demand.

Alexander Thomas & Co., iron and steel factors, formerly located in rooms 302-303 German National Bank Building, Pittsburgh, have removed their offices to rooms 302-303 Hussey Building, 101 Fifth avenue, in that city.

H. E. Collins & Son, iron and steel factors, Pittsburgh, Pa., have removed their offices from third floor of Bank of Commerce Building to the seventh floor in the same building.

Wharton Furnace, at Port Oram, Morris County, N. J., has blown out. It had been in continuous operation since January 12, 1893.

Goff & Horner, iron and steel factors, Lewis Block, Pittsburgh, Pa., have taken the agency in the Pittsburgh district for the sale of the product of the Princess Furnace of D. S. Cook at Glen Wiltton, Va. This furnace makes an extra quality of soft strong foundry iron.

The Pennsylvania Bolt and Nut Works of Lebanon, Pa., have resumed work in all departments on full time. The plant has been more or less idle for a number of months.

Machinery.

The Robinson-Rea Mfg. Company of Pittsburgh, manufacturers of rolls and rolling mill machinery, have recently placed in their works an electric planer purchased from Wm. Sellers & Co., incorporated, of Philadelphia. The planer

is 27 feet long, and is said to cut at the rate of 13 feet per minute.

The Denver Hardware Mfg. Company, near Denver, Col., have just closed a contract of over \$100,000 with Denver parties for the manufacture of hand mining drills.

The United States Iron & Tin Plate Mfg. Company, Demmler, Pa., have recently placed a contract for a second Mesta patent pickling machine with the Leechburg Foundry & Machine Company of Pittsburgh. The first Mesta machine in operation at the above plant has been running for about two years, and has been pickling from 40 to 45 tons of sheets per day. The Leechburg Foundry & Machine Company have received orders for three of these machines during the last two weeks.

The Twin City Iron Works of Minneapolis will build a large machine shop in connection with their plant at Fourth street and Twelfth avenue, south. The building will be iron clad and will cost \$10,000.

The Lodge & Davis Machine Tool Company of Cincinnati, Ohio, are building for the Card Electric Motor & Dynamo Company of the same city one of their large standard engine lathes to be driven by electricity. The motor will be placed in the headstock, taking the place of the usual cone pulley, and attached direct to the live spindle.

The iron work for the extension of the E. W. Bliss Company foundry building, at Brooklyn, N. Y., will be furnished by the Berlin Iron Bridge Company of East Berlin, Conn.

The National Water Tube Boiler Company of New Brunswick, N. J., have just completed the erection of 2500 horse-power of their National boilers, at Youngstown, Ohio, for the Ohio Steel Company. The boilers are arranged in units of a little over 300 horse power each, have automatic smoke consuming furnaces, automatic carriers and feeders, and every provision for convenient handling of the fuel. The same company purchased the National boilers which were used in the World's Columbian Exposition at Chicago, and these boilers are now being delivered and will soon be erected. These, together with those just erected, will give a total of over 4000 horse-power. The National boilers are very heavy in comparison with others, and the 4000 horse-power referred to required about 36 large freight cars, enough to make a heavy freight train, in their transportation.

The Cleveland Twist Drill Company have just furnished the U. S. cruiser "Columbia" with a full complement of twist drills and tools.

The copartnership between S. B. Patch and Geo. Swift as founders, at Streator, Ill., under the firm name of Patch & Swift, is dissolved. The general foundry and machine business will be carried on by S. B. Patch and the stove repair business will be carried on by George Swift. S. B. Patch will receive and pay all debts of the late firm.

A new emery wheel is being put on the market by the Asphalt Emery Wheel Company, Worcester, Mass., which were recently organized, with W. C. Barnard as general manager. They will make all kinds of asphalt or coal tar emery wheels, disc wheels, cup wheels, &c. It is claimed that the new wheels are free cutting, will not glaze or draw the temper. They will be sold at about the same price as the ordinary wheel.

McMillin Brothers, Kent avenue and Rutledge street, Brooklyn, N. Y., have taken out a permit to erect a brick foundry, 40 x 100 feet in size.

The 1200 employees of the Farrel Foundry & Machine Company, Ansonia, Conn., have received notice that on April 2 the order cutting their wages will in part be rescinded. The company announce that business is improving rapidly and that they expect by April 1 to run their entire plant at least 60 hours a week.

The sheriff has taken charge of the place of business of the Sterling Emery Wheel Company, at No. 174 Fulton street, New York, on attachments for \$15,029, of which \$12,029 is in favor of J. Murat Hirsch, for notes given to the Hampden Emery & Corundum Company and for merchandise, and \$3000 in favor of the Commercial Bank of Hammond, Ind., on two notes. Both attachments were granted on the ground that they are a Massachusetts corporation. They have factories at West Sterling, Mass., and at Tiffin, Ohio. An officer of the company said that he did not care to

make any statement regarding the company's financial affairs, but would merely say that they were paying the penalty of a foreign corporation. The company were incorporated in May, 1887, with a capital stock of \$40,000 and at first manufactured all their goods at West Sterling, but in 1890 they built another factory at Tiffin, Ohio. It is said the company have a large stock on hand which they have been unable to dispose of, manufacturing establishments on which they depended having been idle so long. It is claimed that the company have sufficient assets to pay in full if time is allowed to market them. The liabilities are reported to be about \$30,000 and nominal assets \$75,000.

Thirty molders in the employ of O. B. North & Co., New Haven, Conn., struck against a 10 per cent. reduction in wages.

The Perkins Pump & Engine Company of San Francisco, Cal., have been incorporated with a capital stock of \$50,000.

The new plant of the Ingersoll-Sergeant Drill Company, near Easton, Pa., is to be still further enlarged by the erection of a brick structure 160 x 100 feet in size, to be used for machine work.

The real estate, machinery, stock and tools of the insolvent Phoenix Foundry & Machine Company of Syracuse, N. Y., have been sold at public outcry. The principal creditors were the purchasers, the real estate realizing \$50,000, the machinery \$15,149, and the stock \$10,100.

Efforts are being made at Grand Rapids, Mich., to organize a stock company with a capital of \$50,000 for the manufacture of machinery and special appliances.

The United States Projectile Company of Brooklyn, N. Y., will erect a brick machine shop, 99 x 102 feet in size, to cost \$8500.

The Belle City Malleable Iron Company of Racine, Wis., will rebuild their factory destroyed by fire a short time since.

The Pratt & Whitney Company of Hartford, Conn., have opened New York warehouses at 136-138 Liberty street, in charge of G. T. J. Byam. Here they will carry a stock of their machine tools and a complete line of their small tools. This will insure the prompt delivery of any of the latter tools, and will do away with the inconvenience and annoyance which have been the result of having no place in New York where a full stock of these tools could be found.

Hardware.

On the 16th inst. an order was granted in the Circuit Court authorizing A. C. Frank, assignee of the Racine Hardware Mfg. Company, Racine, Wis., to pay a dividend of 10 per cent. on the liabilities of the company, and all parties holding notes or orders against the company are notified to file the same. The liabilities amounted to \$400,000.

The Young's Axle Oil Cup Company have recently been organized in Ellsworth, Maine, for the purpose of manufacturing Chas. C. Young's new patent axle oil cup. The capital stock of the company is \$40,000, divided into 4000 shares at \$10 each. F. W. Rollins is president of the company, A. M. Hopkins, treasurer, and Chas. C. Young, general manager. The goods will continue to be manufactured in Boston for the present.

Buckeye Mfg. Company, Union City, Ind., have made arrangements to remove to Anderson, Ind. They have been given a bonus equivalent to \$22,000 in cash and a free gas franchise for a limited number of years.

The Aetna Nut Company's rolling mill, at Southington, Conn., has shut down indefinitely. Between 50 and 60 hands have been thrown out of work.

Derby & Ball's scythe snath factory, at Bellows Falls, Vt., is running five days a week.

The Eagle Lock Company, Terryville, Conn., have made a general reduction in wages of from 10 to 25 per cent.

The tin factory of S. A. Hsley & Co., Adams and York streets, Brooklyn, N. Y., was destroyed by fire on the 13th inst. The loss is estimated at about \$200,000, fully covered by insurance. Some 300 men, women and girls have been thrown out of employment.

Arnold & Co., Norwalk, Conn., are giving increased attention to general foundry work, making difficult cored work a specialty.

The plant of the E. D. Clapp Mfg. Company, Auburn, N. Y., is running full time with a larger force than at any time since last August. More than the usual number

of contracts with large carriage manufacturers have been made for 1894, so that steady work is expected for the rest of the season. The company are about to issue a new catalogue of their manufactures.

In *The Iron Age*, March 8, in a paragraph relating to the Port Townsend Steel Wire & Nail Company, we inadvertently stated that they were located at Tacoma, Wash. The company's mills, offices, &c., are situated at Port Townsend, Wash.

The League Cycle Company of Hartford advise us that they have just received large orders for their chainless roadsters, and also for the ladies' chainless safeties for shipment to Central America. Negotiations are now in force for other foreign shipments to be made shortly.

The partnership heretofore known as Cincinnati Mfg. Company, Cincinnati, Ohio, has been dissolved and has been succeeded by an incorporated company, under the style of the Cincinnati Mfg. Company. The company comprise with others the members of the old firm, and will have ample facilities and capital to handle the brush and wire goods trade. The officers of the company are H. H. Suydam, president; Joseph Chambers, vice-president, and J. S. Chambers, secretary and treasurer.

Waddell Wooden Ware Works, Greenfield, Ohio, have purchased all the certificates of stock of the Chillicothe Mfg. Company of Chillicothe, Ohio, and have removed the stock, material, machinery, patterns, &c., to their works at Greenfield, where they will continue as sole manufacturers to make the line of family coffee mills known to the trade as "Quick Grinders." These goods will bear the labels of the old company, in order to distinguish them from Waddell line of "Ideal" coffee mills. In their notice of this change Waddell Wooden Ware Works say they are now promptly filling orders for both lines of mills and ask that all communications be addressed to them at Greenfield, Ohio.

The Anthony Wayne Mfg. Company, Fort Wayne, Ind., refer to the success which their Wayne combination washer, a description of which appeared in our columns some months since, has met at the hands of the trade, but while recommending this washer they are still making their well-known Anthony Wayne washer in its improved form, its mechanism having been simplified and its efficiency increased. Other specialties of the company are the Anthony Wayne ironing board and the Steel Clad, Superb, Good Idea, Daisy, Superior, Rival, Novelty, Swan and Continental wringers.

The plant of Edward Darby & Sons, Pennsylvania Wire Works, Philadelphia, was badly damaged by fire March 14. The flames broke out in the basement and ate their way to the roof through the elevator shaft before the firemen arrived. The third and fourth floors of the building, used as stock rooms, were completely gutted, while the lower floors were seriously injured by water. The origin of the fire is unknown. The damage done is fully covered by insurance.

The plant and stock of the Century Bicycle Mfg. Company on Virginia avenue, Indianapolis, Ind., was destroyed by fire on the 27th inst. The fire is supposed to be of incendiary origin. The loss is estimated at \$60,000.

Miscellaneous.

The Bath (Maine) Iron Works are said to have made an offer to New London, Conn., in regard to locating their plant at that place. They ask for \$100,000 in cash; that \$150,000 in bonds be taken, and that a large tract of land be given them, as well as exemption from taxes and other minor concessions. For all this they agree to erect a plant to cost about \$400,000, not including a dry dock, which would be an after consideration. The proposition has staggered the New London promoters of the scheme, and it is not thought that a deal will be made.

The Macneale & Urban Safe Works of Hamilton, Ohio, have resumed with a force of 75 men, and expect to give employment to the entire force at an early date.

The Shultz Belting Company, St. Louis Mo., report quite a improvement in the demand for belting. Their foreign shipments during the past week include 10,000 feet to Russia, 3500 feet to England, and 1500 feet to Belgium.

A. C. Saunders, formerly connected with M. A. Hanna & Co. at Cleveland, and H. B. Nye, lately of Mack & Nye, have become associated in the coal, iron ore and pig iron commission business under the

style of A. C. Saunders & Co., with offices at 507 and 508 Western Reserve Building, Cleveland, Ohio. The new firm have taken the agency for the Northwestern Fuel Company and the New Pittsburgh Coal Company.

The Coe Brass Mfg. Company of Torrington, Conn., are about to enlarge their plant by the erection of two extensions, 45 x 115 feet and 40 x 80 feet. They will be of brick, one story high, with iron truss roofs.

There is a probability of the Rogers Locomotive Works, at Paterson, N. J., starting up full time and with a full force early in May.

Justus Roe & Sons, steel tape manufacturers of Brooklyn, have begun the erection of a factory, 25 x 105 feet in size, at Patchogue, L. I., to which they intend to move their Brooklyn plant.

Among the recently authorized corporations in Illinois may be noted the Seymour Power Wheel Company, Chicago. Capital stock, \$10,000,000; incorporators, James P. Maxwell, W. H. Jacobs and E. S. Walker.

Although it is not clearly brought out in any part of the report of the Secretary of the Navy in the Carnegie armor plate frauds, there is one important point which to some extent justifies its attitude. It has been difficult to understand how one party to a contract can assess damages for inferior quality of product when that party freely acknowledges that the goods delivered are better than the minimum requirements. In one particular, however, the armor plate contracts differ from the basis of ordinary commercial transactions. The buyer promises to pay a premium for performance above the maximum for acceptance. If the seller, therefore, manifestly fails to do the best work of which he is capable, he is doing the other party an injury which may be measured by damages. The report does not state, although an inference may be drawn from one of the navy officers' communications, that premiums have actually been paid to the Carnegie company under their armor plate contracts. In fact, one newspaper statement places the exact amount at \$7,682.79 in total payments of \$1,846,160. The course of the company is being watched with a good deal of interest, particularly on the point whether the responsibility of the irregularities will be fixed upon one or more employees, and what steps will be taken so far as their punishment is concerned.

The regular monthly meeting of the Foundrymen's Association will be held at the Manufacturers' Club in Philadelphia, on Wednesday, April 4, at 8 o'clock p.m. "Melting gray iron by open hearth practice," and "How long may iron be held in the cupola after the blast is on?" are subjects for discussion; and the subject "Foundry Chemistry" will be further discussed. The secretary of the association announces the establishment of a "Question Box," through which members may, without disclosing their names to other than the secretary, present subjects of interest to foundrymen for discussion at any meeting.

R. S. Newbold & Son of Norristown, Pa., have taken a contract for the supply of 250 cast iron fence posts and 1900 feet of wrought iron fencing for the new insane asylum of the Southeastern District of Pennsylvania, at Norristown. They are also engaged on two 150 horse-power boilers and a steel stack 50 inches in diameter, 90 feet long, for the Alan Wood Company, Conshohocken, Pa.

The Iron ^{AND} Metal Trades.

The feeling in the Iron trade throughout the country is a slight shade better, and is due chiefly to the fact that the large Pittsburgh mills seem to have gotten their order books into slightly better shape, and are not as desperate as they were. Billets are firmer and cannot now be bought under \$15.50, Pittsburgh.

Merchants and mills are crowding buyers for specifications on the ground that they have intimations from the railroads that present cut rates of freight may be recalled at any time and higher figures be substituted at ten days' notice.

Adjustments of freight rates have continued lately, the Eastern Pennsylvania furnaces having secured a good reduction to New England points. The Southern furnacemen have not got much help from lower rates in territory north of the Ohio River, but some of them are evidently anticipating reductions by the Southern lines, since they are falling into the habit of quoting delivered prices.

Pittsburgh and Valley Foundry Iron makers are hunting for orders in Eastern territory, and claim to have a further fighting margin if present prices made by them do not bring them the business they want. Some consumers of Foundry Iron are taking advantage of the eagerness of sellers and are contracting for Iron far toward the end of the year. But the great majority cannot be tempted by any concessions to engage their future requirements.

This applies as well to the whole line of Finished Iron and Steel. No one expects a revival of business before something final has been done in Congress. Since even the most sanguine in Washington hold out little hope before the end of June, buyers feel pretty confident that chances now offered will occur again at some time during the next three months. Under the circumstances the stocking up movement which is expected to start the quick upward turn is yet quite far off—apparently.

While this condition of affairs continues no lasting rise in prices is looked forward to. As it is, the withdrawal of one great seller simply brings another hungry mill into prominence. Still, record breaking has pretty well stopped, although the lowest prices are still being made on every important transaction coming up.

A little improvement is noted in Chicago in the Steel Rail business, but on the other hand the Eastern works confess freely that they can not see, from present indications, where any business of any consequence for the second half of the year is to come from. All the important roads in their territory have contracted for their 1894 requirements, and a good share of the quantities involved has already been delivered.

Chicago.

(By Telegraph.)

Office of *The Iron Age*, 59 Dearborn street, CHICAGO, March 28, 1894.

With a fair volume of business and prospects good for a steady increase, prices continue to settle. Lower quotations than ever have been made within the past week on Iron and Steel products. The question is asked with greater force than ever before, how long is this drop in values to continue? The end must be close at hand. Orders coming in are plainly to cover absolute requirements only, as they are for limited quantities of all sizes and descriptions, but the frequency with which they are received shows that stocks are absolutely exhausted. A general attempt to stock up would lead to a very heavy demand, which would quickly cause an upward movement in prices. If some decisive action was speedily taken on the tariff there would undoubtedly be immediate improvement.

Pig Iron.—The market has been less active, but local Irons have taken the lead in whatever business has been done. Large transactions are rare, the week showing but one sale of 1000 tons. A new idea is developing in the Pig Iron trade here. Consumers are asking arrangements with dealers for regular carload shipments at such times as to cover requirements at the prices ruling at the beginning of the contract, with the understanding that the arrangement is to continue as long as both parties are satisfied. It is understood that dealers will advise their customers of changes in rates so as to treat them fairly, and the expectation is that this arrangement will continue indefinitely or until some decided change occurs in the tone of the market. It saves a great deal of trouble to both parties and is regarded very favorably by those who have so far entered into it. Southern manufacturers appear to be anticipating a drop in freight rates, as they are now endeavoring to make contracts at a delivered price instead of at the furnace, as heretofore. Lake Superior Iron is moving only in single carloads, but the time is fast approaching when some good sized contracts are to be expected from large consumers who have not yet completely given up the use of Charcoal Pig Iron. Quotations are given as follows for cash:

Lake Superior Charcoal.....	\$15.00 @ \$15.25
Local Coke Foundry, No. 1....	11.75 @ 12.25
Local Coke Foundry, No. 2....	11.00 @ 11.75
Local Coke Foundry, No. 3....	10.75 @ 11.00
Local Scotch.....	12.00 @ 12.50
Ohio Strong Softeners No. 1....	13.00 @ 14.00
Southern Silvery, No. 1.....	11.00 @ 12.50
Southern Silvery, No. 2.....	11.00 @ 11.75
Southern Coke, No. 2.....	11.25 @ 11.50
Southern Coke, No. 3.....	10.75 @ 11.00
Southern, No. 1, Soft.....	11.25 @ 11.50
Southern, No. 2, Soft.....	10.75 @ 11.00
Tennessee Charcoal, No. 1....	15.50 @ 16.00
Tennessee Charcoal, No. 2....	15.00 @ 15.25
Southern Gray Forge.....	10.25 @ 10.50
Alabama Car Wheel.....	18.50 @ 18.65
Jackson County Silvery.....	15.00 @ 16.00
Other Ohio Silvery.....	13.00 @ 13.50
Coke Bessemer.....	12.00 @

Bars.—The inquiry is better from manufacturing establishments and from jobbers. More car work is being placed, and with the advance of the season the consumption is becoming greater in a general way. The improvement thus far has only been in the enlargement of demand and not in any stiffening of prices. In fact, quotations are somewhat lower than they have been at any previous time. Common Bar Iron is selling fairly at 1.05¢ @ 1.15¢, Chicago, while Soft Steel Bars are quoted at 1.20¢ @ 1.25¢. A notable transaction was the purchase of between 5000

and 6000 Axles by a car manufacturer. Jobbers report a considerably better demand from stock, but quotations are unchanged at 1.35¢ @ 1.40¢ for Bar Iron, and 1.35¢ @ 1.45¢ for Soft Steel Bars.

Structural Material.—Bridge work is so dull that bridge builders are now turning their attention to building contracts which are coming up. One local bridge company successfully competed for the erection of the new Hale Building, which will require about 600 tons of Beams and other material. The Beams go to a Pittsburgh house. More business is being done in small lots of Beams and other Structural Material for building purposes. Quotations on mill shipments are as follows for Chicago delivery: Beams and Channels, 1.35¢ @ 1.40¢; Tees, 1.50¢ @ 1.60¢; Angles, 1.35¢ @ 1.40¢; Universal Plates, 1.30¢ @ 1.35¢. Small lots from stock are sold at an advance of 10¢ @ 15¢ @ 100 lb above these prices.

Plates.—Dealers have handled the bulk of the business coming up since our last report, and they consequently report a very much better trade. The tonnage has expanded to something like the old time figures. Among the orders taken are some good ones for Boilers. Manufacturers are now preferring to quote prices at mill instead of delivered, fearing an advance in freight rates. Mill shipments, Chicago delivery, may be quoted as follows: Tank Steel, 1.35¢ @ 1.45¢; Flange Steel, 1.60¢ @ 2.10¢; Fire Box, 2¢ @ 2.05¢. Store prices are as follows: Iron or Steel Sheets, Nos. 10 to 14, 1.80¢ @ 1.90¢; Tank Steel, 1.60¢ @ 1.85¢; Flange Steel, 2.10¢ @ 2.35¢; Boiler Tubes, 75 % off.

Sheets.—Black Sheets have been quiet but Galvanized Iron is moving moderately well. The Sheet Copper manufacturers have made a revision of their schedule, the new prices going into effect on the 22d. The local consumption of Galvanized Iron and Sheet Copper is expected to show a material decrease owing to the favorable building ordinance passed this week by the City Council permitting the construction of bay windows and light shafts covered with Sheet Metal. Quotations on mill shipments, Chicago delivery, are as follows: No. 27 Common Sheet, 2.25¢ @ 2.30¢; No. 27 Soft Steel Sheets, 2.35¢ @ 2.40¢; Galvanized Iron, 75 and 10 and 5 % to 80 % off; Sheet Copper, 14¢ base, with no discount.

Merchant Steel.—Trade has been somewhat more active. Good contracts have been made for early shipment, while the demand for small lots for immediate delivery is fairly strong. We quote mill shipments, Chicago delivery: Smooth Finished Machinery and Tire, 1.75¢ @ 1.80¢; Open Hearth Spring Steel, 1.85¢ @ 1.90¢; Bessemer Machinery, 1.55¢ @ 1.60¢; Bessemer Tire, 1.40¢; Ordinary Tool Steel, 6¢ @ 7¢; Specials, 12¢ and upward.

Billets and Rods.—The week has been very quiet in both Billets and Rods. Billets are now quoted at \$17.25 @ \$17.50, and Wire Rods, \$25.

Rails and Track Supplies.—A decided improvement is noted in the Steel Rail trade. The railroad managers are convinced that prices will not be reduced, and the large lines are beginning to contract for their summer requirements. New enterprises are becoming more plentiful, but benefits to trade from this direction are only prospective,

as financial arrangements are being slowly perfected. Standard sections are quoted at \$25 @ \$27, according to quantity. Fastenings are unchanged, at 1.40¢ for Splice Bars; 2.40¢ @ 2.45¢ for Track Bolts with Hexagon Nuts and 1.75¢ @ 1.80¢ for Spikes.

Old Rails and Wheels.—The Old Iron Rail market is dead. Quotations are nominally made by dealers at \$10 @ \$11, but they say that railroad managers seem to have an agreement not to dispose of any Track; consequently business is at a standstill. Some movement is reported in Old Steel Rails at \$7 @ \$8 for mixed lots. A sale of 1000 tons of Old Car Wheels is reported and quotations are continued at \$10.50 @ \$11.

Scrap.—Cast Scrap is in fair demand, but other classes of Old Material are very quiet. Dealers quote the following selling prices net ton: No. 1 Forge, \$8.50 @ \$9; No. 1 Mill, \$6.50; Pipes and Flues, \$6; Heavy Cast, \$7.50; Stove Plate, \$5.50 @ \$6; Fish Plates, \$12; Horseshoes, \$8.50; Mixed Steel, gross ton, \$5.

Metals.—Lake Superior Copper in carload lots continues to be quoted at 10½¢, but the trade are now awaiting the opening of lake navigation, when they expect to see this price slightly reduced. Casting Copper is quoted at 9½¢, but the market is weak. Spelter has gone off and is now offered at 3.60¢ @ 3.62½¢. Pig Lead is very firm at 3.27½¢. Refiners are asking 3.30¢, but the market has not as yet worked up to this point. The prospects indicate considerable business this week or the early part of next.

Pittsburgh.

(By Mail.)

Office of The Iron Age, Hamilton Building, }
PITTSBURGH, March 27, 1894.

No material change in the Iron and Steel trades occurred during the week. The volume of business is moderately large, and in view of the concessions in freights granted to Pittsburgh by the railroads it is expected to increase right along. The larger concerns who are competing actively for trade, both East and West, have their order books in pretty comfortable position. It seems certain that the greater part of the tonnage offering must come to this city, as the Eastern and many of the Western mills are practically helpless when it comes to competing with Pittsburgh for an order. The supremacy of Pittsburgh in the manufacture of Iron and Steel is more firmly established than ever before, and the recent reductions in freights go to show that the Pennsylvania Railroad and other lines as well are commencing to realize it.

Pig Iron.—Considerable Bessemer Pig Iron is changing hands, much of it, however, being in the nature of trades. There is not a great deal of Pig Iron being offered on the market just now, nor on the contrary is there a heavy demand for it. Gray Forge is neglected and weak in price and the same is true of Foundry Iron. Reports are going of sales of Bessemer at a shade under our lower quotation. It is also stated that \$9.25 has been done on Gray Forge. We quote as follows: Neutral Gray Forge.....\$9.35 @ \$9.50, cash. All-Ore Mill.....9.50 @ 9.75 " No. 1 Foundry.....11.50 @ 11.75 " No. 2 Foundry.....10.50 @ 10.75 " Bessemer.....10.35 @ 10.50 "

A sale of 5000 tons of Bessemer for April and May is reported at a price equivalent to about \$10.40, Pittsburgh.

We also note a sale of 1000 tons off-grade Bessemer at \$9.15, Valley furnace, or \$9.75, Pittsburgh.

Billets.—The market is unchanged from our report of last week. A fair number of inquiries are in the market, but some of these are based on prices considerably lower than makers will accept, and the business is refused. All the mills here have considerable Steel booked, and the market is firm, ranging from \$15.50 to \$16 at maker's mill. Some makers who have about all they can take care of for April or longer have set their price at \$16. Others who can take on some Steel for next month would quote \$15.50 @ \$15.75, but have absolutely refused to go below our lower quotation.

Plates and Sheets.—As the season advances the demand grows heavier, and the larger makers here have considerable tonnage booked. For ordinary lots we quote as follows: Tank Steel, 1.10¢ @ 1.20¢; Flange, 1.50¢ @ 1.60¢; Shell, 1.30¢ @ 1.40¢; Fire Box Steel, 1.75¢ @ 4¢, according to quality. The Sheet trade shows no improvement either in demand or prices. We make nominal quotations as follows: No. 24 Soft Steel Sheets at 2.15¢; No. 26 at 2.25¢, and No. 27 at 2.35¢, at mill.

Structural Material.—There is a very fair tonnage going, but nearly altogether for small lots. Early in the year it was confidently expected that the large orders would commence to come in during this month, but so far this has not been realized. Prices for ordinary lots are ruling about as follows: Beams and Channels up to 15 inches, 1.15¢ @ 1.25¢, according to order. Angles and Universal Plates, 1.10¢ @ 1.20¢; Tees, 1.25¢ @ 1.35¢.

Ferromanganese.—We quote at \$52 for 80 % domestic, delivered at buyer's mill.

Bars.—The Amalgamated Association officials and the Valley mill owners are in consultation in Youngstown today and there is every probability that the \$4 puddling rate will be adopted, to become effective on April 1. The demand for Bars is improving slowly and some good sized orders are looming up that are expected to be placed early next month. Prices show no improvement and we continue to quote Soft Steel Bars at 1.05¢ @ 1.15¢, according to order. Common Iron Bars are ruling at 1¢ @ 1.10¢, according to specifications.

Muck Bars.—There is nothing doing and we make nominal quotations of \$19.50 @ \$19.75, delivered at buyer's mill, for best grades.

Skelp Iron and Steel.—There is a slightly better demand, due to the improved outlook in the Pipe trade. It is claimed that our lower quotations prevail only in special cases. We quote Grooved Steel Skelp, .95¢ @ 1.05¢; Sheared Steel Skelp, 1.10¢ @ 1.15¢; Grooved Iron Skelp, 1.15¢ @ 1.20¢; Sheared Iron Skelp, 1.25¢ @ 1.30¢.

Merchant Steel.—The volume of business is somewhat larger. Carriage makers are buying in limited quantities after being out of the market for some months. Prices are ruling about as follows: Bessemer Machinery, 1.30¢ @ 1.35¢; Open Hearth Machinery, 1.60¢ @ 1.70¢; Open Hearth Spring, 1.70¢ @ 1.75¢; Toe Calk, 1.90¢.

Wire Rods.—We quote at \$25 at mill. Some sales of Wire Rods were made in this market last week.

Wire Nails.—The signs of distress in the Wire Nail trade in the Pittsburgh

district, referred to last week, continue and prices are a shade lower. We quote at 95¢ @ \$1 in carload lots for usual specifications. The demand has fallen off considerably and makers are pushing the market for business. The demand for Cut Nails is less active and we quote at 95¢ at mill for usual specifications.

Barb Wire.—The heavy demand for Barb Wire continues and prices are being firmly maintained on the basis of \$2.15 in round lots and \$2.20 in carload lots at mill. Painted is ruling at \$1.75 @ \$1.80 in carload lots. Plain Wire continues in good demand, and we quote at \$1.35 @ \$1.40 in carload lots.

Connellsville Coke.—For the week ending Saturday, March 17, there were 11,219 ovens in the Connellsville region in blast and 6294 idle, the estimated production for the week being 110,741 tons. Compared with the production of the previous week, this was an increase of 2040 tons. In the active list of ovens there was a net gain of 194 ovens. A number of contracts for Furnace Coke for extended periods of delivery have been made on the basis of 90¢ at oven. One recent contract is reported to have slightly shaded this price. We quote Furnace Coke at 85¢ @ 90¢, on board cars at ovens. Foundry Coke is ruling at \$1.05 @ \$1.15 to consumers.

Cincinnati.

(By Telegraph.)

Office of The Iron Age, Fifth and Main Sts., }
CINCINNATI, March 28, 1894.

The only prominent feature of the Pig Iron trade during the week has been weakness. The volume of business was fair in a small way and there was a good inquiry for moderate quantities from one to ten carloads, with sales generally effected, for there is a disposition to supply the wants of consumers without allowing the price to interfere. For instance, No. 2 Foundry has been sold on the basis of \$7 ¾ ton, f.o.b. Birmingham, and if there was any demand for No. 1 a relatively low price would doubtless be made, for there is an accumulation of stock, while the lower grades are better sold up and are less urgently offered. The reduction in freight rates last week, north of the Ohio River, has not served to increase the sales of Southern Iron materially, for the Northern furnaces are meeting the demand in that part of the country very freely and are making such prices as will generally secure the orders. A liberal proportion of the Iron sold goes to consumers in this district, but there is much that goes to the North and East, for Southern Iron is desired for mixing and the price is low enough for all to buy it who want it. There is no movement in Charcoal Iron. Quotations are merely nominal, as follows:

Foundry.

Southern Coke, No. 1.....	\$11.00 @ \$11.25
Southern Coke, No. 2.....	9.75 @ 10.00
Southern Coke, No. 3.....	9.50 @ 9.75
Ohio Soft Stone Coal, No. 1....	14.50 @ 15.50
Ohio Soft Stone Coal, No. 2....	14.25 @ 14.50
Lake Superior Coke, No. 1.....	13.00 @ 13.50
Lake Superior Coke, No. 2....	12.00 @ 12.25
Hanging Rock Charcoal, No. 1..	17.00 @ 17.50
Hanging Rock Charcoal, No. 2..	16.50 @ 17.00
Tennessee Charcoal, No. 1.....	13.50 @ 14.00
Tennessee Charcoal, No. 2.....	12.50 @ 13.00

Car Wheel and Malleable Irons.

Standard Southern Car Wheel	16.75 @ 17.50
Lake Superior Car Wheel and Malleable.....	16.50 @ 17.00

Forge.

Gray Forge.....	9.00 @ 9.25
Mottled Coke.....	9.00 @ 9.25

Philadelphia.

Office of *The Iron Age*, 230 South Fourth St.,
PHILADELPHIA, Pa., March 27, 1894.

The general report seems to be that things are looking a little brighter. We should be glad to have something tangible to confirm this, but unfortunately there is nothing of that kind in sight. At the same time it would be unfair to ignore such reports after the trade have been asked for an opinion and have expressed it as above mentioned. They say they are receiving more inquiries, they are increasing their sales slightly, without being asked to accept lower figures, and they feel sanguine that the coming month will be an improvement on any of the five or six months immediately preceding. This is not an unreasonable expectation, but it will be noted that it is a guess at the future, rather than that business in hand is an absolutely realized fact. There ought to be an improvement and it is pretty certain that there will be, but it is doubtful if it will affect the local trade at present. With \$1.50 freight on Pig Iron from Pittsburgh, \$1.70 on Billets, and 10¢ per hundredweight on Finished Material, all the advantages are in favor of the West, and until there is a very decided increase in the demand in that section local mills and furnaces will gain little or nothing, as it is impossible to compete at prices now ruling. This statement, we believe, fairly covers the situation, but we shall be glad if events in the near future show that a more sanguine view might have been taken.

Pig Iron.—The market holds its own, which, under the circumstances, is a pretty good feature. With 10,000 tons a week increase in the supply, and with lower freights from competing points, it is surprising how well the market holds. We are not out of the woods yet, however, and before any decided opinion can be formed it will be well to see what developments will be made during the next three or four weeks. It is not claimed that consumers are increasing their orders to any extent, but they certainly take what they need without dickerings much in regard to prices, which every one feels are as low as they ought to be, as they are certainly at the lowest they have ever been. It is a common remark that it is not a question of price, but one of necessity. If buyers need Iron they will take a stipulated quantity, but an attempt to increase the quantity by the offer of a slightly lower price would be likely to place the seller in the position of having to change his price without enlarging the order. Under these conditions there is no absolute certainty in regard to the immediate future, although with a moderate increase in the demand somewhat better prices might be expected, or the reverse if the supply keeps on increasing without a corresponding increase in consumption. General quotations are about as follows for Philadelphia and equivalent points, with the heaviest end of the business at inside figures:

No. 1 Foundry	\$13.00 @	\$13.25
No. 2 Foundry	12.25 @	12.50
Standard Gray Forge	11.00 @	11.25
Ordinary Gray Forge	10.75 @	11.00
No. 1 Soft	12.00 @	12.25
No. 2 Soft	11.00 @	11.50
Western Bessemer	12.25 @	12.50

Steel Billets.—The change in the freight situation has confused things considerably. With f.o.b. prices at \$15.25 @ \$15.50, Pittsburgh, and \$1.70 freight, consumers naturally figured on \$17 @ \$17.25 as a delivered price.

This advantage, however, the Western people appropriated to themselves, leaving the delivered price \$17.25 @ \$17.50, at which figures large buyers are not willing to do business. Consumption in the East is not large, however, and with freights so strongly in favor of the West, there is no chance for a heavy consumption either in Plates, Sheets or Shapes, which comprise the bulk of the business, although the Wire Rod people may buy heavily providing they get a price to suit them. Sales in 1000-ton lots were made last week at a shade under \$17, delivered; asking prices, however, are \$17.25 @ \$17.50.

Finished Material.—Business during the week has been fairly active in small and medium sized lots, but there is little or nothing offering in the way of large orders. Mills hereabouts have not been able to increase their output, partly because there is not business enough to go around, but mainly because Western mills secure all the big work by making prices which cannot be met by local concerns. The drop in freight rates to 10¢ per 100 lb from Pittsburgh enables them to quote 1.15¢ @ 1.20¢, delivered, on Plates and Angles, and still lower prices for Bars, so that we are hardly in it at this end of the line, except for specialties. The outlook is said to be a little better, particularly in structural work, but it would be exaggeration to say that there is anything very bright either as regards demand or the chance of better prices. The only order of importance taken within the past few days is one by the Edge Moor Iron Company for a bridge at Sunbury, Pa., probably 1000 tons in all. The bulk of the material is to be Iron, and will therefore be most likely taken by some mill in the East. Other Iron orders are around, and it begins to look as though business in this line might pick up a little, although in competition with Steel prices will have to be cut very close. General quotations are about as follows, subject to liberal concessions on large lots:

Grooved Skelp, delivered	1.15¢ @	1.25¢
Best Refined Bars	1.20¢ @	1.30¢
At interior points	1.10¢ @	1.15¢
Tank Steel	1.20¢ @	1.30¢
Heavy Plates	1.30¢ @	1.40¢
Shell	1.40¢ @	1.50¢
Flange	1.60¢ @	1.80¢
Angles	1.20¢ @	1.30¢
Beams and Channels	1.50¢ @	1.60¢

Old Material.—The demand is slightly better in some lines, but there is a full supply, so that prices are unchanged, as follows:

Heavy Melting Steel	\$10.00 @	\$11.00
Light Melting Steel	8.00 @	9.00
No. 1 Wrought Scrap	10.00 @	11.00
Machinery Cast	9.50 @	10.00
Wrought Turnings	8.50 @	9.00
Cast Borings	6.50 @	7.00
Old Iron Rails	12 50 @	13.00

At a meeting of the Mississippi Committee of the Western Freight Association, held at Chairman Midgley's office in Chicago last week, it was resolved that the rates on iron articles described in association tariff No. 177 (except rails, steel, new) from Chicago and Peoria to Mississippi River points, Hannibal to Dubuque inclusive, be made as follows: From Chicago, 8½ cents per 100 pounds; from Peoria, 6½ cents per 100 pounds, when in carload lots. In less than carloads rates will be 15 cents from Chicago and 11 cents from Peoria.

The Bureau of Mines of Ontario is investigating an alleged discovery of tin ore in the Sudbury district.

St. Louis.

(By Telegraph.)

Office of *The Iron Age*,
Bank of Commerce Building,
St. Louis, March 28, 1894.

Pig Iron.—The past week has shown some improvement over previous ones so far as the volume of business is concerned. Sales for the week will aggregate say 4000 tons, which while in itself not large, is yet for these times a fair showing. Prices are weak, and there appears no chance whatever for any improvement in this direction. No. 2 Foundry is now practically at a \$7.25 basis, which is just \$2 less than was quoted one year since. We quote as follows for cash, f.o.b. cars St. Louis:

Southern Coke, No. 1 Foundry	\$11.25 @	\$11.75
Southern Coke, No. 2 Foundry	10.25 @	10.50
Southern Coke, No. 3 Foundry	10.00 @	10.25
Southern Gray Forge	9.75 @	10.00
Southern Car Wheel	16.75 @	17.75
Lake Superior Car Wheel	16.25 @	16.50
Ohio Softeners	14.25 @	14.50

Bar Iron.—At 1.10¢, half extras, f.o.b. cars East St. Louis, the market seems to have halted in its downward tendency. Mills are just as anxious for orders as they have been, but seem to hesitate about quoting lower than the price above named. There is nothing in the situation to warrant any advance, and as the demand continues of a hand to mouth character a lower range of prices seems the inevitable result. Jobbers quote 1.30¢ @ 1.35¢, according to quantity.

Barb Wire.—There continues to be a good demand for Hardware, but the weakness noted in our last report continues to assert itself. Notwithstanding the fact that mills have practically all the orders they can attend to, there is a disposition to shade prices. If this policy is adhered to prices will likely be in a bad way when the present demand shows signs of falling off. Mills quote \$1.95 @ \$2 for Painted, with 5¢ per cwt. less for carload orders. Galvanized is quoted at 40¢ per cwt. additional.

Wire Nails.—Mills continue to be only fairly well employed, and in the present condition of prices are not hunting trade very vigorously. Outside mills are making some low prices with the evident intention of holding their trade, which was threatened by the price of \$1.15, made by a local jobber. Jobbers report a fair trade.

Rails and Track Supplies.—Outside of an occasional order for Splices there is absolute dullness reported in this department. Railroads are buying only what is absolutely necessary to keep their equipment in running order, and their requisitions call for less and less as the months go by. Prices are naturally weak in consequence of the light demand, and are quoted as follows: Splice Bars, 1.35¢ @ 1.40¢; Spikes, 1.75¢ @ 1.80¢; Bolts, Square Nuts, 2.10¢; with Hexagon Nuts, 2.20¢; Links and Pins, 1.75¢ @ 1.80¢. Old Iron Rails are dead at \$10 @ \$11, and Steel Rails are in the same condition at \$26 @ \$26.50.

Pig Lead.—The market is strongly held at from 3.20¢ to 3.25¢. The demand is not heavy, but there does not appear to be any weakness in prices.

Spelter.—Sales made to-day were on the basis of 3.65¢, at which price the market is firmly held. Bids of 3.60¢ do not find any sellers.

Metal Market.

Pig Tin.—Straits Tin has advanced in price to the extent of about $\frac{1}{2}$ ¢ lb. Five-ton lots were sold at 19.30¢, net cash, for prompt delivery, and 19.40¢ @ 19.50¢ was paid on the exchange for August delivery. Speculation is still very tame and almost wholly between a few local operators, but sales to jobbers and consumers have increased somewhat and made quite an impression upon the stocks in importers' hands. The latter fact has been instrumental in helping the advance in prices, but a rise of £1. 5/ in London seemed to have had more force in that direction, and, to all appearances, the market is governed mainly by sentiment and manipulation in which European operators are the leading spirits. Early in the month April delivery was offered at as low as 18.25¢ and distant futures at a considerable discount, including August at 17¢. During the past week April delivery went to 19.25¢ and sales were recorded of August at 19.40¢ @ 19.50¢. This radical change in quotations is at least suggestive.

Copper.—Reports were decidedly in contrast with those of the preceding week, as far as reference to business is concerned. Without exception they indicated a decided falling off in transactions, and were not without evidence that the demand has dropped off in a somewhat surprising manner. The offering has, meanwhile, continued quite free and of sufficient weight to slightly weaken prices. Thus 9.50¢ has become a common selling price for Lake Superior Ingot here, while private advices intimate that a lower rate has been quoted in the English market. Electrolytic has been sold here at 9.30¢, and rumors prevail of business having been put through at a shade less, but it is claimed now that Pig Copper can be sold at a relatively better price in foreign markets. Casting Copper, well known brands, is offered at $9\frac{1}{2}$ ¢, and as low as 9¢ is said to have been accepted for some that are not very popular.

Pig Lead.—Sales have fallen off considerably, but prices are held quite firmly. The demand is much slower than it was during the ten days or fortnight preceding the week under review, and the appearances are that dealers who sold "short" some time ago have covered to a great extent. There is little trade demand at present, in any event, and large consumers seem to be quite indifferent. Prices stand at 3.40¢ @ 3.50¢, according to brand and terms of sale.

Spelter.—There has been no improvement in business here, and purchases at other points, it is reported, have fallen off more or less. To this extent the market is weaker in tone. Prices are not positively lower, however, and the offering is not much freer, if at all larger, than it has been previously this month. Prices do not vary a great deal from the basis of 3.80¢ @ 3.85¢ for ordinary Western brands.

Antimony.—Business is only fair, but sufficient to keep prices at about 8 $\frac{3}{4}$ ¢ @ 9¢ for Hallett's and 10¢ @ 10 $\frac{1}{2}$ ¢ for Cookson's.

Nickel.—The popular quotation is 40¢, but sales are moderate and that price is doubtless extremely high for large lots.

Tin Plate.—Dealings are still backward for the season. The demand is

extremely tame also. In fact, there is hardly any business except that which may be forced by imperative wants. Little, if any, further concession in prices has been made, but selling pressure is still sufficient to keep the market weak in tone. We quote as follows: Coke Tins—Penlan grade IC, 14 x 20, \$5.15; J. B. grade, do., \$5.25; Bessemer full weight, \$5.20; light weights, \$4.80 for 100 lb, \$4.70 for 95 lb, \$4.55 for 90 lb. Siemens Steel scarce. Stamping Plates—Bessemer Steel, Coke finish, IC basis, \$5.40; Siemens Steel, IC basis, \$5.50; IX basis, \$6.60. Charcoals—Melyn grade, IC, \$6.35; Crosses, \$7.87 $\frac{1}{2}$; Allaway grade, IC, \$5.40 @ \$5.50; Crosses, \$6.60; Grange grade, IC, \$5.60; Crosses, \$6.70. Charcoal Ternae—Worcester, 14 x 20, scarce; do., 20 x 28, \$11.85; M. F., 14 x 20, \$7.25; do., 20 x 28, \$14.50; Dean grade, 14 x 20, \$5.25; do., 20 x 28, \$10.50; D. R. D. grade, 14 x 20, \$5.15; do., 20 x 28, \$9.90; Alyn, 14 x 20, \$5.25; do., 20 x 28, \$10.40; Wasters—S. T. P. grade, 14 x 20, \$4.60; do., 20 x 28, \$9; Abercarne grade, 14 x 20, \$4.50; do., 20 x 28, scarce.

David T. Day, Chief of the Division of Mining Statistics and Technology, United States Geological Survey, has issued the following preliminary statement by C. Kirchhoff, agent, of the production of Spelter and Zinc Oxide for the year 1893:

Production of Spelter in the United States, by States (Short Tons).			
States.	1891.	1892.	1893.
Eastern and Southern States	13,182	14,495	12,684
Illinois	28,711	31,383*	29,596
Kansas	22,747	24,715	24,815
Missouri	16,253	16,567	13,737
Totals	80,873	87,160	78,892

*Including Indiana.

The decline in the output took place entirely during the second half of the year, as follows:

States.	First half 1893.	Second half 1893.
Eastern and Southern States ..	7,380	5,304
Illinois	16,427	13,169
Kansas	13,239	9,546
Missouri	8,718	5,019
Totals	45,794	33,038

Stocks of Spelter on January 1, 1894, were as follows:

States.	January 1, 1893.	January 1, 1894.
Eastern and Southern States ..	3,316	3,796
Illinois	12	974
Kansas	483	335
Missouri	349	379
Totals	4,160	5,484

The exports of domestic Spelter in the past year were 3639 tons in 1893, and 6247 net tons in 1892, as compared with 2147 net tons in 1891.

ZINC OXIDE.—The production of Zinc Oxide is estimated at 24,059 tons, of which 14,954 net tons was produced in the Eastern district, as compared with 19,129 tons in 1892, and 9150 was made in the West in 1893, as compared with an estimate of 7700 tons in 1892.

The American Metal Company have issued the annual statement of Henry R. Merton & Co. on the production of Spelter in Europe:

Spelter Production in Europe.		
	—Gross tons.—	—
	1893.	1892.
Rhine District and Belgium ..	149,750	143,305
Silesia	90,310	87,760
Great Britain	28,375	30,310
France and Spain	20,585	18,662
Austria	7,560	5,120
Poland	4,530	4,270
Total Europe	301,110	289,327

New York.

Office of *The Iron Age*, 95-102 Reade street, }
New York, March 28, 1894.

American Pig.—The market in this immediate vicinity has continued quiet, although the situation has become more complicated through the more urgent offering of Pittsburgh, Mahoning and Shenango Valley Foundry Irons. Excellent Iron from the last two districts is being offered at \$12.30 for No. 2 Foundry, and it is intimated that even lower figures can be made for tempting business. The majority of sellers of standard brands decline to contract beyond July, but some of the Southern furnaces are going beyond that time at current prices. Virginia furnaces in particular are competing sharply and are giving long time options to capture new trade. The furnaces in the Lehigh Valley have been granted reductions in freights to New England points, the rates to Worcester, Springfield and other points having been made \$1.75 against \$2.50 formerly. It is reported also that the Eastern Pennsylvania furnaces are getting cheaper anthracite coal, and have secured lower freights on ore and other materials. We quote standard brands \$12.75 @ \$13.50 for No. 1; \$12 @ \$12.50 for No. 2; \$11.25 @ \$12 for Gray Forge, at tidewater. Southern Iron, same delivery, \$12.25 @ \$13 for No. 1; \$11.00 @ \$11.50 for No. 2; \$10.75 @ \$11.25 for No. 3; \$11.25 @ \$11.75 for No. 2 Soft, and \$11.75 @ \$12 for No. 1 Soft. Foundry No. 4 (Foundry Forge) is \$10.50 @ \$11.

Ferromanganese and Spiegeleisen.—Nothing has been done. We quote domestic Ferromanganese \$51 @ \$51.50, tidewater, and foreign Spiegeleisen nominally \$21 @ \$22 for 10 %, and \$24.50 @ \$25 for 20 %, ex ship.

Billets and Rods.—The market in this district is very dull. We quote \$17.50 @ \$18 for domestic, and nominally \$27 @ \$27.50 for foreign. Domestic Wire Rods are nominally \$27.25 @ \$27.50, and foreign \$39 @ \$40, tidewater.

Steel Rails.—The market in Standard Rails is lifeless. The old practice of accepting bonds in payment of Rails has been entirely abandoned, so that promoters of new schemes, of which there are quite a number, must do their own financing. Under the state of affairs prevailing in Wall street at the present time this leaves all such projects in embryo. Light Rails still show signs of weakness, although as low as \$24 @ \$26 is quoted. There is a fair run of orders for Girder Rails, which are quoted \$24 @ \$25 at mill.

Track Material.—We quote as follows for small lots: Spikes, 1.65¢ @ 1.80¢; Fish Plates, 1.25¢ @ 1.40¢; Track Bolts, Square Nuts, 2¢ @ 2.10¢, and Hexagon Nuts, 2.20¢ @ 2.30¢, delivered.

Manufactured Iron and Steel.—The contract for the material for the building of the American Surety Company, amounting to about 3000 tons, has been placed, Pittsburgh capturing the order. It is stated that about 20 large buildings are still to be placed, so that there is a good outlook for a large tonnage. The Maryland Steel Company have taken an order for a boat for the Miners Transportation Company. The material, of course, goes to Central Pennsylvania mills. Some low prices have been named in this market for Iron Bars. We quote: Beams up to 15-inch, 1.30¢ @ 1.50¢, for round lots; Angles, 1.20¢ @ 1.35¢; Universal Mill Plates,

1.15¢ @ 1.35¢; Tees, 1.40¢ @ 1.60¢; Channels, 1.30¢ @ 1.50¢, on dock. Steel Plates are 1.20¢ @ 1.30¢ for Tank; 1.35¢ @ 1.40¢ for Shell; 1.55¢ @ 1.60¢ for Flange, and 1.75¢ @ 2¢ for Fire Box, and 2¢ @ 2.25¢ for Locomotive Fire Box, on dock; Refined Bars are 1.25¢ @ 1.9¢, on dock, and Common 1.15¢ @ 1.25¢; Soft Steel Bars are 1.15¢ @ 1.30¢; Scrap Axles are quotable at 1.35¢ @ 1.50¢, delivered; Steel Axles, 1.35¢ @ 1.50¢, and Links and Pins, 1.40¢ @ 1.60¢; Steel Hoops, 1.45¢ @ 1.60¢, delivered; Cotton Ties, 65¢ @ 72½¢ @ 45-lb bundle, at mill; Machinery Steel, 1.25¢ @ 1.40¢; Toe Calk, 1.80¢ @ 1.90¢, and Sleigh Shoe, 1.60¢ @ 1.75¢, delivered.

British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, March 28, 1894.

Pig Tin for prompt delivery sold up to £69. 2/6 prior to the Easter holidays, advanced about 10/ immediately thereafter and subsequently lost all the gain. During the interval there were free offerings by representatives of Eastern houses, but this was neutralized in part by the turn for the better in silver and good demand from consumers. Transactions, however, were not large enough to offset the pressure of realizing sales. Hence prices dropped to £68. 10/ for prompts and £69. 7/6 for three months' futures. At the close the market was spiritless.

Copper prices have undergone hardly any change. Dealings of speculative nature were chiefly between a few of the larger houses, outside interests being restricted by the holidays. Latest dealings in Merchant Bars were at £40. 17/6 for prompts and £41. 7/6 for three months' futures. Best Selected English is quoted at £44.

Tin Plate is without radical change. Special sizes have been in quite good demand, but business otherwise has been confined to cheap lots for prompt shipment. Included in the latter were 14 x 20 Bessemer Cokes at 9/9, f. o. b. Wales. There is some improvement in the demand for Charcoals, with 11/, f. o. b. Swansea, bid from Canada for ordinary sorts. Stocks at Swansea are now about 295,000 boxes. There is trouble at several mills owing to makers opposing workmen's attempt to limit production to 36 boxes per day. Liverpool quotations are quoted as follows:

IC Charcoal, Alloway grade.....12/ @ 12/6
IC Bessemer Steel, Coke finish..... @ 10/6
IC Siemens.....11/ @ 10/6
IC Coke, B. V. grade, 14 x 20.....Nominal.
Charcoal Terne, Dean grade.....10/ @ 10/6

Pig Lead has met with slow sale and prices are barely steady at £9. 2/6 for Soft Spanish.

Spelter is steady at £15. 12/6 for ordinary Silesian, but meets with rather slow sale.

There is some improvement in the demand for Steel Rails; otherwise the general market for Steel and Iron remains quiet. Prices have undergone very little change. Last sales of warrants were at 43/ for Scotch, 36/ @ 36/1½ for Cleveland and 44/11 for Hematite.

The American Steel Casting Company.

A number of erroneous reports have been published relating to the organization and purposes of the American Steel Casting Company. In order to present correct information in the matter, the following data has been obtained from Henry Weston and Nelson J. Waterbury, Jr., of this city, who have conducted the negotiations which have eventuated in the purchase of the properties of the Solid Steel Company of Alliance, Ohio; the Standard Steel Casting Company of Chester, Pa.; the Sharon Steel Casting Company of Sharon, Pa.; the Syracuse Steel Foundry Company of Syracuse, N. Y.; the Norristown Steel Company of Norristown, Pa.

These properties have been purchased outright by the parties forming the company and have been conveyed to the new company. No pool is formed, nor is any pool or combination aimed at. Ample working capital has been provided by the purchasers. No stock has been offered to the public. The works will be operated under one management, the managers of the old companies being interested in the American Steel Casting Company. They are men of experience, and it will be their effort to systematize the business in such a way as to enable the company to manufacture the best quality of steel castings and to fill orders promptly. The steel casting business has been in an unsatisfactory condition for more than a year past.

The capital of the new company is \$4,200,000, of which one-third is 7 per cent. preferred stock and two-thirds is common stock. There is also a bonded indebtedness of \$740,000.

The president of the company is J. K. Bole, formerly president of the Solid Steel Company; vice-president, Daniel Eagan, formerly of the Sharon Steel Casting Company. The directors are: J. K. Bole, Daniel Eagan, Frederick Frazer of the Syracuse Steel Foundry Company, Augustus Trump of Pittsburgh, who will be secretary, George J. Humbert of the Norristown Company, Henry Weston and Charles N. King. S. H. Williams will be treasurer. The office will be at Thurlow, Pa., and the management will be vested in an executive committee consisting of J. K. Bole, Daniel Eagan and Frederick Frazer.

Buffalo Furnace is reported to have made 236 tons in one day, using Connelville coke.

The Ellwood Ivins Tube Company, Philadelphia, Pa., are drawing a series of tubing samples for C. D. Mosher, the marine engineer. When delivered they will be subjected to severe tests for the purpose of determining the availability of employing similar tubes in the construction of boilers to be erected in three or four United States naval vessels, contracts for which have been awarded him. This mill is also about commencing the manufacture of tapered tubes drawn in all metals, with walls of uniform thickness. They are now drawing high carbon tubes up to ½-inch and low carbon to 5-inch, inclusive. In all the other metals they are prepared to draw seamless tubes from ¼ to 5 inches in diameter, any desired form, either round, square, corrugated, &c., with any thickness of wall. They call especial attention to

their aluminum and aluminum bronze seamless tubing, the latter they assert never before made, especially valuable, they claim, on account of great tensile strength and rigidity of the metal, together with its non-corrodibility and high heat conductivity.

The Detrick & Harvey Machine Company of Baltimore have recently purchased from the Capitol Mfg. Company of Chicago their business of manufacturing the well-known Adams bolt threading and Cook nut tapping machines. The Detrick & Harvey Machine Company have an excellent plant, and will have increased facilities through special machinery.

CONTENTS.

	PAGE.
Iron and Steel in Shipbuilding.....	599
The Wattles Gas Engine. Illustrated ..	599
The Waddell Lift Bridge.....	601
Economy of Steam in Rolling Mill Engines.....	602
English Pig Iron and Steel Production.....	603
Scotch Pig Iron Warrants.....	603
A Fire Proof Dwelling.....	603
Tube Sheets and Tubes of Boilers of War Ships. Illustrated.....	604
Geared Power Boiler Feed Pump. Illus.	605
The Needham Process for Treating Wire Rods.....	605
Canadian Notes.....	605
The Purdy Oil Cup. Illustrated.....	606
An Instructive Eye Bar Test.....	606
The Coale Straightway Valve. Illus.....	607
Meyer Bros. Company's Tin Plate Works.....	607
Influence of Silicon, Sulphur and Manganese on Foundry Irons.....	607
Pittsburgh in the Pig Iron Trade.....	610
Wire Rope Prices.....	610
The Finished Iron Market of Canada.....	611
The Week.....	612
Trade Publications.....	612
Editorials:	
The Recovery of By-Products in Coking.....	613
Cheap Scrap Iron.....	613
American Manufacturers and the World's Market.....	613
The Recent Freight Reduction.....	614
Washington News.....	614
Obituary.....	615
Personal.....	615
The Canadian Tariff.....	615
Cupola Heat and Quality of Cast Iron.....	616
Manufacturing:	
Iron and Steel.....	618
Machinery.....	618
Hardware.....	619
Miscellaneous.....	619
The Iron and Metal Trades:	
Chicago.....	620
Pittsburgh.....	621
Cincinnati.....	621
Philadelphia.....	622
St. Louis.....	622
Metal Market.....	623
New York.....	623
British Iron and Metal Markets.....	624
The American Steel Casting Company.....	624
Hardware:	
Condition of Trade.....	625
Notes on Prices.....	625
Hardware Merchants and Manufacturers' Association of Philadelphia.....	626
A Question in Regard to Settlement of Account.....	627
Personal.....	627
Sporting Goods Center.....	627
Van Wagener & Williams Hardware Company.....	627
The Shopper's Friend.....	627
Bicycle Notes.....	628
Specialty Mfg. Company.....	628
H. & D. Folsom Arms Company.....	628
Trade Items.....	628
Hartley & Graham.....	629
Price-Lists, Circulars, &c.....	629
It Is Reported.....	629
Paints and Colors.....	630
Standard Broom, Brush and Tool Holder. Illustrated.....	630
Butts with Ball Bearing Washers Ill.	631
The Colton Junior Single Track Hanger. Illustrated.....	631
The National Steel Farm Fence. Illus.	632
Milk Can for Mule Back.....	633
The Schultze Padlock. Illustrated.....	633
Improved Adjustable S-Wrench. Illus.	634
Wire Cloth Holder. Illustrated.....	634
Americau Pruning Shear. Illustrated.	634
New Alarm Tilt. Illustrated.....	634
Duplex Wrought Butts.....	634
The Oster Adjustable Die Stock. Illus.	635
Safety Razor Stropping Machine. Ill.	635
Multi-Stroke Door Bell. Illustrated.....	635
Crown Asbestos Griddle. Illustrated.....	636
Dolan's Nut Clamp. Illustrated.....	636
Home Trainer for Bicyclists. Illus.	636
Columbian Wire Fence Tightener. Ill.	636
Standard Towel Holder. Illustrated.....	636
Current Hardware Prices.....	637
Current Metal Prices.....	644

HARDWARE.

Condition of Trade.

MARCH draws to a close with a fair volume of business, there having been during the past week or two a perceptible improvement. The demand was doubtless stimulated by the fine spring like weather which prevailed, and has not apparently been seriously affected by the subsequent cold snap, which, however, it is feared has done more or less damage to the crops. It is noticeable that the trade are purchasing a greater variety of goods than for some time, their orders covering both Heavy and Shelf Hardware and seasonable goods. There is also more inquiry for Builders' Hardware and Mechanics' Tools, all the orders indicating that stocks in dealers' hands are light and that the trade are purchasing conservatively. Several houses supplying manufacturers report that their orders indicate an improvement in the demand which is made on the manufacturers and their resumption of more energetic and enterprising efforts in the prosecution of their business. Prices, we regret to report, are in a condition far from satisfactory, and on many lines of goods there is a disposition to name lower prices than have heretofore prevailed. There is also a good deal of irregularity in the prices of the jobbing trade, and some of them are naming exceptionally low prices with a view to inducing business. This cutting of prices is to be regretted, as its natural tendency is to diminish the jobbers' profits. The financial condition appears to give little cause for complaint or apprehension, collections being fair.

Chicago.

(By Telegraph.)

The very cold weather of the past few days has not yet been felt in any diminution of trade. The spring thus far has been extremely favorable to the Hardware interests. There has been no mud blockade, as usual. The farmers are much ahead of previous years in their preparations for crops, and are now making improvements which involve the consumption of considerable Hardware. The movement in Shelf Hardware shows more activity within the past week, and jobbers expect that March will be abreast of March of last year. The de-

mand for small goods shows a heavy gain during January and February. The proportion was one-half to two-thirds of staple goods, but now three-fourths of the business consists of small goods and straight Hardware. An excellent business is being done in seasonable goods. Tinware and Metals are quiet. Heavy Hardware jobbers report a decided gain in the volume of business. Orders are now coming in from Carriage builders who have deferred active operations so long that they will be obliged to push things actively in order to be in proper shape to transact business this year. The demand is excellent from other manufacturing consumers who purchase supplies from the jobbers.

St. Louis.

(By Telegraph.)

The demand for shelf goods is fairly active. The extremely cold weather prevailing throughout the entire country has caused a decided falling off in business, which, however, it is expected will only prove temporary. At the same time a heavy trade is reported, especially so in all kinds of Wire Cloth, both heavy and light. Prices are firm and advances in this line of goods are almost assured. There is no great snap to the market, however, and it is difficult to induce dealers to buy in large quantities. Gasoline stove manufacturers report an excellent trade, the pleasant weather which prevailed during the first three weeks of the present month being particularly favorable for the sale of these goods. Prices do not show any improvement except in a few lines where a scarcity of goods has developed.

Notes on Prices.

Wire Nails.—These goods continue in excellent demand, and the aggregate of the business for the current month will be large. There is some complaint in regard to prompt shipments, but as a rule orders are being executed without delay. There is, however, no accumulation of stock in the hands of the manufacturers. In the matter of price the market is perhaps not quite so strong as it has been, and is represented by the quotation of \$1.05 to \$1.10 for carload lots at mill, the former figure being usually obtainable on good orders, while it is shaded by some of the manufacturers in special cases. Some of the mills, however, refuse to make a lower price than \$1.05. Small lots from store in New York are held at \$1.25 to \$1.30.

Chicago, by Telegraph.—The reduced price put in effect here upon the lower-

ing of freight rates appears to be generally maintained. Manufacturers are well supplied with orders for future shipment, extending certainly over the next four weeks, and perhaps further. Orders for immediate delivery have been refused in some cases, because manufacturers are unable to fill them. Factory quotations are equivalent to about \$1.10, Chicago. Jobbers are holding prices to the country trade at \$1.20 to \$1.25, but on city business there is some little irregularity. Their carload trade is light at present.

Cut Nails.—The demand for Cut Nails continues fair and the mills report the receipt of many orders, though, as a rule, they are for comparatively small quantities, the trade pursuing a conservative policy and refusing to buy beyond their immediate requirements. Some of them refer to the fact that they can see evidence of a reaction in some sections from the use of Wire Nails and a return to Cut Nails. The prices of the Eastern manufacturers for Nails delivered at the principal points in their territory are as follows: New York, Albany, Boston and Savannah, \$1.05; Buffalo, \$1.02; Harrisburg and Philadelphia, \$1. In view of the active competition with Wire Nails and under a desire to secure what business there is going the above prices are shaded 5 and in some cases 10 cents. The price quoted for Nails from store in New York is \$1.10 and \$1.15.

Chicago, by Telegraph.—Manufacturers are much pleased with the trade they are having this spring, which exceeds their expectation. While orders from the South and Southwest are large the local demand has also been good, and in some cases jobbers' orders have been unusually heavy. Specifications are coming in freely on contracts and inquiries continue to promise good business. Factory prices are now \$1 on 55-cent average. Jobbers quote small lots from stock at \$1.15.

Barb Wire.—The manufacturers of Barb Wire are to be congratulated on the steady and large demand and also on the regularity which characterizes prices. The trade are continuing to purchase freely and the mills are fully occupied. There does not, however, appear to be any difficulty in obtaining Wire promptly. Quotations are on the following basis for carload lots of Four Point Galvanized: Pittsburgh, \$2.15; Cleveland, \$2.20; Cincinnati or Allentown, \$2.25; Chicago or New York, \$2.35, with an advance of 5 cents per 100 pounds in less than carload lots.

Chicago, by Telegraph.—Trade in both Plain and Barb Wire keeps up exceedingly well and prices are strong. The demand is of the same character as previously noted. Those who usually buy in carloads are taking ton lots, but they are buying much oftener, and the volume of business is kept up. Quotations are \$2.35 to \$2.40 for small lots of Galvanized Barb Wire from stock and \$2.25 to \$2.30 for carloads.

The Ellis Warming Box.—This article was described in our last issue as put on the market by J. T. Ellis, Box 262, Newark, N. J. The Warming Box is sold to the trade at \$1 each, subject to a discount of 25 per cent.

Sheet and Bolt Copper.—For some time past the market for Sheet and Bolt Copper has been irregular, the list having been quite generally discarded and much lower net prices made, representing, it is said, in some cases a discount of 50 per cent. With a view to correcting this condition of things, a revised list bearing date March 22 has been issued by the manufacturers and is printed below. Some changes have also been made in the extras. The new list, which is to a certain extent provisional and may perhaps be modified before long, is as follows, terms cash without discount:

Sheet Copper, per lb., cents.		64 oz. and over.	32 oz. and up to 64 oz.	16 oz. and up to 32 oz.	14 oz. and up to 16 oz.	12 oz. and up to 14 oz.	10 oz. and up to 12 oz.	8 oz. and up to 10 oz.	Lighter than 8 oz.
Not wider than 30 inches.	not longer than 72 inches.	14	14	14	15	16	17	20	22
Wider than 30 inches but not wider than 36 inches.	longer than 72 inches....	14	14	14	15	17	19	23	...
Wider than 36 inches but not wider than 48 inches.	not longer than 96 inches.	14	14	14	16	18	23	25	...
Wider than 48 inches but not wider than 60 inches.	longer than 96 inches....	14	14	15	17	19	23	27	...
Wider than 60 inches but not wider than 84 inches.	not longer than 96 inches.	14	14	16	18	20	24	...	...
Wider than 84 inches.	longer than 96 inches....	14	14	17	19	21	25	...	...
	not longer than 96 inches.	14	14	19	21	26	...	...	...
	longer than 96 inches....	14	15	20	23	...	...	...	...
	not longer than 96 inches.	15	16	21	25	...	...	...	...
	longer than 96 inches....	16	17	22	27	...	...	...	...
		17	19	...	...	...	...	...	...

Bolt Copper, $\frac{3}{8}$ inch diameter and over, 14 cents per pound.
 Circles, Segments and Pattern Sheets, 60 inches wide and less, 3 cents per pound advance over price of sheets required to cut them from.
 Circles, Segments and Pattern Sheets, over 60 inches to and including 96 inches, 4 cents per pound advance over price of sheets required to cut them from.
 Circles, Segments and Pattern Sheets, over 96 inches, 5 cents per pound advance over price of sheets required to cut them from.
 Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, 1 cent per pound over the foregoing prices.
 Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, 2 cents per pound over the foregoing prices.
 All Copper polished one side, not over 20 inches wide, 1 cent per pound additional to cold rolled prices.
 All Copper polished one side, over 20 inches wide, 2 cents per pound additional to cold rolled prices.

Tinning.

	Cents.
Tinning Sheets, on one side, 10, 12 and 14 x 48.....each	6
Tinning Sheets, on one side, 30 x 60.....each	25
For Tinning Boiler Sizes, 9 inches (Sheets 14 x 60 inches).....each	12
For Tinning Boiler Sizes, 8 inches (Sheets 14 x 56 inches).....each	10

For Tinning Boiler Sizes, 7 inches (Sheets 14 x 52 inches).....each 8
 Tinning Sheets, on one side, other sizes.....per square foot 2
 For Tinning both sides, double the above price.

Copper Bottoms, Pits and Flats.

	Cents.
14 ounces and over to square foot....	18
12 ounces and up to 14 ounces square foot.....	19
10 ounces and up to 12 ounces square foot.....	21
Lighter than 10 ounces square foot..	24
All circles under 8 inches in diameter, 2 cents per pound more than foregoing price, and no circles over 13 inches in diameter shall be classed as Copper Bottoms.	

Heath's Ball Valve Pump.—This Pump is being put on the market by the S. F. Heath Cycle Company, Minneapolis, Minn. It was described in a recent issue. It is sold to the trade from the following list, terms 30 days net, or 5 per cent. discount for cash received in ten days from date of invoice :

	Each.
In lots of 6 to 12 Pumps.....	\$1.50
" " 13 to 50 Pumps.....	1.35
" " 51 to 100 Pumps.....	1.20

Sanitary Garbage Pail.—This Pail was described in a recent issue as put on the market by the Sanitary Garbage Pail Company, Detroit, Mich. The Pails are sold to the trade at \$21 per dozen for the 12-gallon size and \$33 per dozen for the 20 gallon size.

Glass.—The demand for Window Glass continues moderate and the mar-

ket is without special feature. Pittsburgh quotations remain as before—85 and 10 and 5 per cent. discount for single, and 85 and 20 per cent. discount for double strength Glass. The total number of pots in operation at the present time is said to be 942, but it is expected that a number of factories will resume operations within the next week or two. An advance has just taken place in French Window Glass, which is now held at 80, 10 and 5 per cent. discount. A satisfactory condition of things is reported in Imported Glass circles, the demand being fair, with an encouraging outlook for the future.

Hardware Merchants and Manufacturers' Association of Philadelphia.

A VERY SUCCESSFUL and enjoyable meeting of the Hardware Merchants and Manufacturers' Association was held on the 20th inst. in Boldt's Café, Boldt's Building, Fourth street, Philadelphia. About 50 members of the association were present. The regular business occupied about two hours, when luncheon was served. Upon reassembling at 8 p.m. the association listened with much interest to a paper by J. H. Ritter, entitled "Our State Insolvency Laws." The discussion which followed was participated in by W. W. Supplee, president of the association, Robert W. Mallon, T. James Fernley, secretary, and others.

The following resident and non-resident houses were elected to membership in the association :

ACTIVE.

P. & F. Corbin, 925 Market street.
 A. O. Bills, 3015 Chestnut street.
 Yale & Towne Mfg. Company, 1120 Market street.
 Ellicott Fisher Company, 357 South Front street.

NON-RESIDENT.

Landers, Frary & Clark, New York.
 C. T. Ham Mfg. Company, Rochester, N. Y.
 Stanley Rule & Level Company, New Britain, Conn.
 Winchester Repeating Arms Company, New Haven, Conn.
 The Union Nut Company, New York.
 Lindsay & McCutcheon, Allegheny, Pa.
 J. H. Graham & Co., New York.
 Wm. Rogers Mfg. Company, Hartford, Conn.
 Peck, Stow & Wilcox Company, New York.
 The Chas. Parker Company, Meriden, Conn.
 The Pike Mfg. Company, Pike Station, N. H.
 J. M. King & Co., Waterford, N. Y.
 Stanley Works, New Britain, Conn.
 American Wringer Company, New York.
 Holmes, Booth & Haydens, New York.

The practice which has been pursued by the association of having a monthly essay by one of the members has become an important feature, and has resulted in bringing out many admirable papers, which have been received with much favor. Among the essays thus presented since this plan was inaugurated are the following, which, it will be observed, touch upon a good many matters of general trade interest :

JAS. H. RITTER : How to improve our mutual interests as merchants and manufacturers.

HUGH McCAFFREY: How can manufacturers make the business more profitable to jobbers?

W. W. SUPPLEE: The relation between manufacturers and jobbers and between each other as jobbers.

T. JAS. FERNLEY: Morality in business.

E. K. TRYON, JR.: Morality in business.

C. M. BIDDLE: How a merchant can obtain rational enjoyment without neglecting his business; or, my experience as a sportsman.

C. M. CHRISKEY: Historical reminiscences.

L. W. MAHR: Philadelphia as a manufacturing city, and what can be done by us as an association to promote its interest in this direction.

J. W. GRANGE: What can the business man do to render his life a more perfect success?

FAYETTE R. PLUMB: The new Philadelphia.

ALLYN BREWER: The Building Commission.

W. D. SUPPLEE: The boulevard.

T. JAS. FERNLEY: Against the boulevard.

W. W. SUPPLEE: Our present business depression; to what extent is the tariff discussion responsible?

A Question in Regard to Settlement of Account.

FROM a gentleman connected with a prominent manufacturing concern in Michigan we have the following problem, which we take pleasure in laying before our readers, from whom we should be pleased to hear in regard to the matter:

A purchases from B merchandise to the extent of \$400, terms of settlement being freight allowed to point of delivery, four months' time, or 6 per cent. discount for cash in ten days. A takes advantage of the cash discount and sends settlement as follows:

Face of invoice.....	\$400
Less 6 per cent. for cash.....	\$24
Freight.....	10— 34

Amount of draft.....\$366

A pays the above account, believing the stock to be satisfactory, but after two months finds a defect in the execution of the order, which prevents his using the stock in his business, and returns the entire stock, receiving in exchange similar but satisfactory goods, amounting to \$500, same terms of settlement as the first lot. He again takes the cash discount. Now, the question is, what kind of settlement is necessary to balance the account justly, and how does he arrive at the amount of the draft to balance the account?

Personal.

WILSON DAVIS LYON, who is the representative of Sherman & Lyon Company in South Africa, is at present in this country and will soon return to South Africa, where he will continue to represent the company in the varied lines of goods which they are offering as representatives of American manufacturers.

THE MANY FRIENDS of W. A. Willard, the genial manager in this city of Lamson & Goodnow Mfg. Company and A. F. Towle & Son Company, will learn with regret that he met with a painful accident last Saturday morning, in the fracture of his collar bone, the result of a fall caused by a sudden attack of vertigo. Owing to much extra labor, made necessary by the re-

cent fitting up of the company's handsome new store on Broadway, supplemented by the decease of his wife two weeks ago, Mr. Willard had overworked himself and brought on the attack of vertigo, which was, however, slight and temporary.

Sporting Goods Center.

THAT SECTION of Broadway between Reade and Pearl streets, New York, is made more than ever a trade center for athletic and sportsmen's goods, Arms, Ammunition, Bicycles, Fishing Tackle, Cutlery, &c., owing to the recent removal to this territory of a number of well-known dealers who make a specialty of this class of wares. Within the 400 feet contained in the two blocks may now be found Hartley & Graham, Winchester Repeating Arms Company, H. & D. Folsom Arms Company, United States Net & Twine Company, Thomas T. Conroy, Schoverling, Daly & Gales, Hawks & Ogilvy, W. C. Hodgins & Co., W. Fred. Quimby, H. Strugnell, C. B. Fitzmaurice, Landers, Frary & Clark, Lamson & Goodnow Mfg. Company, Waterbury Brass Company, Hunter Arms Company and Empire Target Company. In Reade and Duane streets, close to Broadway on either side, are in addition a large number of firms who have long been in the neighborhood doing a similar business.

Van Wagoner & Williams Hardware Company.

THE REORGANIZATION of the Van Wagoner & Williams Company has been effected, the receivership terminated and the business has been transferred to a new corporation called the Van Wagoner & Williams Hardware Company, organized under the laws of New Jersey, with an authorized capital of \$750,000, upward of \$500,000 of which is fully paid up. The new company start business with very little indebtedness, the basis of the reorganization having been payment in full of all obligations with preferred stock. The officers of the new company are as follows: C. S. Van Wagoner, president; Wm. H. Williams, vice-president; Sylvanus Bourne, treasurer; C. T. Stork, secretary. Mr. Van Wagoner will have charge of the manufacturing and general business, and, with Mr. Bourne, will be in Cleveland, Ohio. Mr. Williams will be in general charge of the sales department, with headquarters in New York, where Mr. Stork will also be located.

The new company start under favorable auspices, and their many friends in the Hardware trade will extend to Messrs. Van Wagoner and Williams their hearty congratulations on this solution of their business difficulties.

It will be remembered that the Van Wagoner & Williams Company had just completed a fine new plant at Cleveland, Ohio, when the general financial distress of the country forced them into the hands of receivers at a time when they were apparently enter-

ing upon a career of prosperity. With the adjustment of their difficulties on so satisfactory a basis and the retention of their former officers and force, who have been so long favorably known to the Hardware trade, a successful future may reasonably be expected for this popular firm.

The Shopper's Friend.

A RETAILER who has evidently had considerable experience with buyers sends us the following regarding the disinterested friend who frequently accompanies a customer and who tries the patience of the salesman:

A salesman meets with a great many trying people in his daily experience, but the one that is the hardest to treat with smiling courtesy is the shopper's friend. Human nature is so constituted that we like to have the advice of a friend. A man is passing the store with a companion and our window reminds him that he needs a Knife. He asks his friend to come in with him and I step forward to wait on them. I learn their mission and get from the intending purchaser an idea of the kind of Knife he wants, which is quickly placed before him. Before he has time to examine it the friend reaches for it; it is not at all such a Knife as he would buy, for this or that reason, sometimes a sensible reason, but oftener a mere whim. "Haven't I got a Knife so and so?" "Yes." I get out several Knives of that kind, and am almost selling one when the friend (who has been studying the showcases) sees something entirely different and wants "George" to look at this. George looks at it, wants to examine it closer, and begins to consider the purchase of this. Before he reaches the point of saying he will take it the friend has seen another pattern that George must examine, and so it goes for an hour. Not seldom George goes back and buys the Knife he asked for at first. Occasionally he will get so mixed up over the friend's recommendations and instructions that he will not buy at all, while, if he does buy, a great deal of time has been wasted by the busy-body friend.

But if the man and his friend are trying, what shall be said of the average woman and her friend? Time is no object with either of them. They have been in half a dozen stores already, and you know that the chances are ten to one that you will not make a sale now. But you put on your best smile and begin the show. The principal is trying enough, but, Oh, the friend! The meddlesome, ignorant friend! She scolds you for daring to ask her friend such a price; she scouts your claims as to quality; she knows a dozen places where her friend can buy the same goods at half the price. If you do make a sale you do it in spite of the interference of this annoying creature, yet as she goes out she tells you that she brought her friend to your store and you are indebted to her for having made the sale. You have to pretend to believe this and to be under great obligations to her as you bow her out. Then you step on a tack and feel better.

Bicycle Notes.

STOKES MFG. COMPANY, 293 Wabash avenue, Chicago, are distributing a very handsome catalogue of their Bicycles. These machines are manufactured by the Union Cycle Mfg. Company, at Highlandville, Mass. The catalogue enters into a full description of the details of manufacture, illustrating the various processes employed in fashioning crude steel into the shapes in which it finally forms a part of a Bicycle, and giving interesting sketches of workmen and their functions. The description shows the very great care taken in this establishment to make every part as thoroughly reliable as possible. Specifications are printed to show how rigid are the requirements which are enforced in producing all the parts of a machine. The wheels illustrated are the Western Union (26 pounds) and Union No. 3 for ladies. A supplementary catalogue issued by the Stokes Mfg. Company illustrates and describes their special line of medium grade Bicycles. These comprise the Juno No. 2 for ladies, the Rob Roy No. 4, the Rob Roy No. 2, the Combination Junior No. 4, the Combination Junior No. 2, the Cinch No. 2, the Boys' Junior, the Pet for girls, and the Jewel convertible for youths and misses.

THE EASTERN CORPORATION have succeeded the Surbridge Mfg. Company of Hagerstown, Md., and with a larger plant expect to materially increase their Cycle business. The Eastern Corporation is, we are advised, officered by practical men of experience, and retains the heads of departments of the old company, together with many of the skilled workmen.

JOHN P. LOVELL ARMS COMPANY, Boston, Mass., have issued their 1894 catalogue relating to their Diamond Cycles. The catalogue is well printed and has a striking front cover. In it illustrations are given of their Model 17 racer, Model 18 light roadster or road racer, Model 19 full roadster, Model 20 ladies' light roadster, and Model 21 convertible light weight. These wheels, with the exception of the racer, which is \$125, are listed at \$115. The catalogue also illustrates a line of cheaper machines, varying in price from \$90 to \$25.

Specialty Mfg. Company.

THE SPECIALTY MFG. COMPANY was organized at Hartford, Conn., on the 21st inst., with a capital of \$50,000. The following are the directors of the new company: Geo. J. Capewell, vice president Capewell Horse Nail Company; E. C. Lewis, president Waterbury Farrel Foundry & Machine Company; John H. Hall, general manager Colt's Patent Fire Arms Mfg. Company; A. W. C. Williams, treasurer Capewell Horse Nail Company; John H. Knight, president First National Bank, Hartford; Austin Brainard of the Aetna Machine Company and Charles Flint. The officers are Geo. J. Capewell, president; Austin Brainard, vice-president; and Charles Flint, secretary and treasurer. At a subsequent meeting it was decided to increase the capital stock to \$100,000, as the original capital was more than subscribed for. The company will engage in the manufacture and sale of patented specialties, including some inventions of Mr. Capewell in the line of Nail and Tack Pullers, Barrel Nail Pullers, Cutting Nippers, &c.

H. & D. Folsom Arms Company.

H. & D. FOLSOM ARMS COMPANY, for years at 15 Murray street, New York, have leased the store and basement, each 25 x 150 feet, at 314 Broadway, between Duane and Pearl streets. This was made necessary by the determination to add a retail department to the wholesale business heretofore carried on. They will make a specialty of Bicycles, handling among others as agents the Imperial, New Mail, Dictator and Zephyr. In addition they will offer a good assortment of fine Guns, high grade Cutlery, a number of the more prominent Cameras, and represent as agents Draper & Maynard, Ashland, N. H., who manufacture baseball sundries. They are also taking on several desirable sporting goods agencies, it being their intention to be in a position to supply the wants of athletes, sportsmen and others for this class of merchandise. The entire premises have been renovated and rearranged specially for them. The front has been modernized by the introduction of a large new show window having a single plate of glass. The forward part of the street floor will be reserved exclusively for retail trade, and is suitably fitted with gun cases in antique oak, counters, shelving, cupboards, &c. The offices are in the rear. The basement will be used for storing stock and packing and shipping goods.

Trade Items.

EATON, COLE & BURNHAM COMPANY, 82-84 Fulton street, corner of Gold, will, on or about May 1, occupy their new quarters in the seven story building fast approaching completion, at the corner of Beekman and Gold streets. This building, which extends back from Beekman street to Ann, is within 200 feet of where they now are.

LAMSON & GOODNOW MFG. COMPANY, 310 Broadway, New York, are gradually working out the details made necessary by the occupation of their new store. The latest is the addition of four handsome new showcases in polished antique quartered oak, supported on carved legs of the same material. Each is 12 feet long, the tops, fronts and ends being of French plate glass, while the backs are mirrored. In these cases are displayed the goods of A. F. Towle & Son Company, Greenfield, Mass., manufacturers of Flatware in Sterling Silver and Plate, the financial interests of the two corporations being largely identical. In two of the cases can be seen sterling goods, while the rest contains Plated Ware.

W. H. COOK, Akron, Mich., has bought out the Implement firm of E. D. Cook & Son, and has added that business to his Hardware establishment.

RECENT IMPORTATIONS of Chas. J. Healy, 121 Chambers street, New York, comprise German Grass Shears, French Toilet and Horse Clippers, Vienna and Naxos Scythe Stones, Belgian, German and Italian Razor Hones and Parisian novelties in Dog Collars and Watch, Key and Dog Chains. Mr. Healy is also carrying a full stock of all the goods represented by his 1892 catalogue.

GILBERT & BENNETT MFG. COMPANY, 44 Cliff street, New York, have recently rearranged the interior of their warehouse and remodeled their offices. The front of the building has been greatly improved by the presence of

four new signs, extending the full width, while a large swing sign has been suspended over the street entrance.

BUEHLER, BONBRIGHT & Co., Philadelphia, have been appointed agents for Rice's patent combination Border Knife and Scuffle Hoe. Their price to the general trade is \$8 per dozen.

GASTON, WESTON & LADD, 15 Murray street, New York, have originated a unique device for advertising their Prestoline Metal Polish. It consists of a prostrate figure about 2 feet long molded out of terra cotta, one hand of which grasps an upraised handle, to the end of which a can of Prestoline is attached, a smaller can being suspended from the latter. The eyes of the figure are fixed intently on the smaller can, which by concealed mechanism is kept moving up and down without apparent cessation or variation. The coloring adds much to the attractiveness of the figure, which excites considerable curiosity, for although the motion is accomplished in a simple way, the method is not apparent to observers. The device is intended for use in stores handling Prestoline.

JOHN H. GRAHAM & Co., 113 Chambers street, New York, are now carrying P. Lowentraub's goods in stock, including Punches, Wing Dividers, Calipers, Gas Pliers, Upholsterers' Hammers, &c., and are in a position to fill all orders promptly.

THE TRADE WILL OBSERVE the page advertisement of the Arcade File Works, Anderson Ind., in which they make some points concerning their Arcade Files. These Files are referred to as made from an extra grade of steel and as manufactured under improved methods and by machinery recently invented by the general manager of the company, Alfred Weed, which machinery they control and use exclusively. The fact is also emphasized that natural gas is used in their works, thus securing an even heat and superior temper. It will be observed also that they refer to the fact that the Arcade File Works were established in 1842, and the company are thus pioneers in the manufacture of Files in this country.

C. PRATT, 69 Beekman street, New York, is offering the Crown Asbestos Griddle, manufactured by Hall & Carpenter, Philadelphia, Pa., which is a novel cooking utensil designed for frying small quantities of food without scorching or burning, and is sold, we are advised, at a very moderate price.

L. M. RICHARDSON, Waltham, Mass., has adopted a new label for the steel spring wire Blind Fast of which he is manufacturer, and which hereafter will be called the Waltham. They will be put up in pasteboard boxes of 10 sets each, 100 sets in a case.

E. BISSELL, SON & Co. among the Special Notices this week announce an assignee's sale of the entire stock of Whips and Lashes manufactured by W. H. Owen. The sale will be conducted at 52 Warren street, New York, Thursday and Friday, April 5 and 6.

ON THE 14TH INST. fire damaged the Wire works of Edward Darby & Sons, Philadelphia, to the extent of about \$16,000. The fire broke out in the annex between the two main buildings, containing the stock room, electric lighting plant, carpenter's shop and polishing rooms, the contents of which were more or less damaged. The loss was fully covered by insurance, and the firm state that their business will not be in the least affected by the fire. They will continue to fill orders with their usual promptness.

Hartley & Graham.

HARTLEY & GRAHAM, 313 and 315 Broadway, New York, have issued a price list of military Arms, Equipments and Ordnance Stores suitable for Grand Army, independent companies, Sons of Veterans, schools, cadet corps, &c., which is, we believe, the only list of the kind published. The assortment includes Remington Rifles and Carbines, Springfield and other military Rifles, cadet Rifles, together with an assortment of similar Arms, in various patterns, styles and finishes. Also Ammunition, Bayonets, Black Leather Equipments, &c. This stock is referred to as first-class and serviceable in all respects and all Arms entirely new, unless classified as refinished or second-hand in the description. In the cadet Rifles they offer an arm that is made in proportion and not constructed of odd parts which have accumulated from the manufacture of regular goods.

Price-Lists, Circulars, &c.

THE WHITMAN & BARNES MFG. COMPANY, New York office 111 Chambers street: Complete illustrated catalogue and price-list of the goods dealt in and produced at their different factories in the United States and Canada. It has 192 pages, each 7 x 9 inches in size. There are numerous varieties of Hardware, including Twist Drills, Rivets, Spring Colters, Reamers, Lawn Mowers, Hammers, Cold Chisels, Wrenches, Screw Drivers, Oilers, Grindstone Fixtures, together with a large assortment of Farm Implements and Agricultural and Industrial Machinery. One of the features of the book is the wide range of Mower Knives, Harvester Sickles, Mower and Reaper Sections, Thresher and Rake Teeth, &c., which they make for many of the largest farm implement makers in this country. Pages 4 and 5 contain 40 illustrations of early ideas in cutting apparatus, most of them invented within the current century.

DE WITT WIRE CLOTH COMPANY, 32 Reade street, New York: Illustrated pamphlet and price-list of Steel Wire Nettings for henneries, pigeon houses, poultry hurdles, rabbit hutches, aviaries, garden and lawn fences, Wire Window and Door Screens.

F. E. MYERS & BRO., Ashland, Ohio: Three catalogues relating to their varied manufactures. One of these relates to their Hay Carriers and Hay Tools, another to their Force and Lift Pumps, and the third to their Spray Pumps. These catalogues are copiously illustrated and contain full descriptive data in regard to the goods shown.

It Is Reported—

That Sabine & Harvey of Boonville, N. Y., will soon remove their Hardware business to Utica.

That the Warner Hardware Company, Freeport, Ill., has been incorporated. The capital stock is \$20,000. The incorporators are L. A. Warner, Geo. W. Warner and Emil A. Hooper.

That Mr. Spettigue will soon open a new Hardware store at Honesdale, Pa.

That the G. B. Churchill Company has been formed at Galesburg, Ill., with a capital stock of \$20,000. They will do a general Hardware business. The incorporators are George B. Churchill, George Churchill and M. L. Churchill.

That the Hardware store of A. S. & A. E. Cooley, Canandaigua, N. Y.,

will hereafter be conducted under the style of Cooley & Co., Mrs. James S. Cooley having purchased the interest in the business lately owned by A. S. Cooley.

That the Wright Bros. Hardware Company, Doniphan, Mo., have been incorporated. The capital is \$10,000.

That the wholesale Hardware establishment of Sickels, Preston & Nutting, Davenport, Iowa, was burglarized on the 12th inst.

That Frederickson & Reitzel's Hardware store, at White Hall, Wis., was destroyed by fire on the 12th inst.

That the Foster Hardware Company have been organized at Huntington, W. Va., with a capital stock of \$50,000. The incorporators are B. W. Foster, Charles Fussell, L. M. Sanford and D. E. Abbott of Huntington, and John Russell of Ashland, Ky.

That W. P. Lett has succeeded Stewart & Lett in the Hardware business at Riverside, Cal.

That Jansen Bros., Hardware dealers, Ritzville, Wash., have sold out to H. T. Jansen.

That Chas. L. Grace is now carrying on the Hardware business formerly conducted by S. C. Summers & Co., Stanton, Mich.

That Hackett & Hebard's stock of Hardware, Stoves, Guns, Implements, &c., was destroyed in a large fire in Augusta, Wis., on the 16th inst. The loss is estimated at \$6500.

That H. D. Sheets, Lewis, Iowa, has put in a stock of Shelf Hardware in connection with his harness shop.

That the Hardware business formerly conducted by Sheldon Bliss, Constantine, Mich., will hereafter be carried on under the style of Bliss Hardware Company, with Arthur Bliss as manager.

That S. A. Maley has sold his interest in the new Hardware store at Rhodes, Iowa, to F. L. Mackey.

That Orr Bros., Murra, Iowa, have just completed an addition to their Hardware store.

That Owings & Stevens, Darlington, Mo., have purchased a two-thirds interest in the Hardware business formerly conducted by Adkisson, Bentley & Co., C. T. Adkisson retiring from the firm.

That the Gorham-Aid Hardware Company, West Plains, Mo., will build an addition to their establishment.

That the Hardware firm of Williams & Sumner, Bayard, Iowa, have dissolved partnership. Mr. Williams has taken the Hardware stock and Mr. Sumner the stock of harness.

That J. W. Delano, Red Wing, Minn., has sold his Hardware store to A. J. Meacham and Frank Meacham, who will take possession about the middle of April.

That Charles Stuart has purchased a half interest in the Hardware store of A. D. Barker, Grand Blanc, Mich., and will enter into partnership with him April 1. The business will be carried on under the style of Barker & Co.

That the firm of Anderson & Forton, Hardware merchants, Stoughton, Wis., has been dissolved by the retirement of O. O. Forton. The business will be continued by Mr. Anderson.

That the La Conner Hardware Company, La Conner, Wash., have dissolved, T. S. Hurd retiring and T. R. Hayton and A. I. Dunlap continuing under the firm name of Hayton & Dunlap.

That the Hardware store of Stephens Hardware Company, Anthony, Kan., was destroyed by fire on the 12th inst.

That S. M. Scribner of Melrose, Mass., has purchased Mr. Burrell's interest in the Hardware business of Burrell & Swett, and the business will hereafter be conducted under the style of Swett & Scribner.

That the Hardware firm of Burget & Lewis, Great Barrington, Mass., have been converted into a corporation under the style of the Burget & Lewis Company. Mr. Lewis is president of the company and Mr. Burget is treasurer and manager. The capital of the company is \$10,000.

That Ross & Gott's Hardware store at Russellville, Ind., was broken into by burglars on the 15th inst., and \$200 worth of goods stolen.

That the Hardware and Agricultural Implement business of Dixon & Hillis, Kokomo, Ind., has been disposed of to Scott Armstrong.

That a new Hardware store has been opened at Canandaigua, N. Y. The style of the firm being Donovan & Van Auken.

That Black & Birchfield's Hardware store at Selma, Ind., was burglarized on the 15th inst. An attempt was made to blow open the safe but it was unsuccessful.

That E. H. Bagley, White River Junction, Vt., is making extensive repairs in the interior of his Hardware store.

That on the 12th inst. burglars carried away the entire stock of pistols of the Scott Hardware Company of Paducah, Ky. This makes the twelfth time that robbers have visited this firm. It is estimated that from \$200 to \$300 worth of Pistols were stolen besides a quantity of Pocket Cutlery.

That the Hardware firm of Wadsworth & Matheson, Jacksonville, Ill., were burned out on the 22d inst.

That A. C. Nicholson's Hardware store, Wheatland, Ind., was robbed on the 18th inst. About \$100 worth of goods were taken.

That David Bland, Chillicothe, Ill., has bought the T. B. Seelye Hardware stock.

That B. A. & E. H. Woodall's Hardware store, Benson, N. C., was burnt out on the 17th inst.

That Martin & West, Hardware dealers of Bloomville, Ohio, have disposed of their business to George Behm.

That sneak thieves broke into the Hardware store of Noll & Sons, Marshfield, Wis., on the 18th inst., and stole \$100 worth of Cutlery, Revolvers, &c.

That John W. Thompson has bought an interest in the Hardware business of John Dixon, Carthage, S. D.

That Lars Underhal has purchased a half interest in the Hardware store of H. Bredal, Kenyon, Minn.

That John Taylor's interest in the Hardware firm of Lefurge & Taylor, Ypsilanti, Mich., has been purchased by T. J. Green. The firm style will hereafter be Lefurge & Green.

That George Cacheux has sold his Hardware store at West Point, Ill., to F. M. Clark.

That the Hardware firm of Dooley & Norris, Kankakee, Ill., is now Norris Bros., O. H. Norris having purchased Mr. Dooley's interest in the business.

That Andrew Maas contemplates entering the Hardware business at Maywood, Ill.

That burglars entered the Hardware store of A. A. Fillebrown & Co., Ayer,

Mass., on the 16th inst., and secured about \$100 worth of Cutlery.

That George N. Baldwin, Colon, Mich., has sold his stock of Hardware to Charles Gray.

That the Hardware store of John Cook, South Greencastle, Ind., was robbed by burglars on the night of the 19th inst. They entered by the front door, and, loading a large, heavy safe on a wagon, carried it 500 yards to a stock pen, and then rifled it of Revolvers, Watches and Jewelry.

That E. Hess' Hardware store, Longview, Ill., was burnt out on the 19th inst. Loss, \$3500.

That the store of Lude & Moffitt, Hardware dealers at Woodsfield, Ohio, was robbed of about \$40 worth of Hardware on the 12th inst.

That J. M. Oliver of Dundas, Minn., will soon enter the Hardware business at Henderson, Wis.

That J. A. Halley has bought an interest in the Hardware and Implement business of E. M. Strauser, at Newtown, Mo.

That \$50 worth of Pocket Knives and Razors were stolen from the Hardware store of Gill Bros., Emerson, Iowa, on the 12th inst.

That W. H. Hand, Hardware merchant, of Maquoketa, Iowa, has taken as partner in his business J. B. Trout.

That W. E. Sibley, Freeport, Ill., has sold his stock of Hardware to the Lowell Hardware Company of Janesville, Wis.

That Olheiser's Hardware store, at Juniata, Neb., was burglarized on the 16th inst., and about \$200 worth of Cutlery, Guns and Silver Ware carried off by the thieves.

That Smith Bros.' Hardware store, at Sheldon, Iowa, was badly damaged by fire on the 17th inst.

That William G. Browning & Son, East Greenwich, R. I., have sold out their Hardware and House Furnishing Goods business to Starr & Bailey.

Paints and Colors.

It should be understood that the prices quoted in this column are strictly those current in the wholesale market, and that higher prices are paid for retail lots. The quality of goods frequently necessitates a considerable range of prices.

White Lead.—There is some change in the temper of reports on the condition of the market, but those reports vary. Upon being sifted they yield no facts that would reflect any decided turn in the general situation. Crude material, it is pointed out, costs about $\frac{1}{2}$ ¢ per lb more than it did a short time ago. The pigment naturally sells more freely with the advance of the spring season. But competition between the consolidated corrodors and the outside concerns continues keen. The manufacturers of various kinds of mixed Leads are also in the contest. Briefly, there is a triangular competition that keeps the market in a perturbed state, and the probabilities are that Dry Lead may yet be purchased in some quarters at prices as low as any that have ruled during the past 60 days. Lead in Oil is not much better off as far as prices are concerned, but more business has been done, as is natural at this season of the year. It is practically impossible to quote prices with accuracy in view of the conflicting interests and more than ordinary tendency to conceal facts.

Red Lead.—The irregularity in prices that has prevailed for some time past

continues, and hardly the normal improvement has taken place in sales of either American or foreign brands. Upon the whole the market is unsatisfactory alike to buyer and seller. No positive change in prices has taken place during the past week.

Litharge.—Dealings have been on a somewhat more liberal scale. The low grade product used by rubber goods manufacturers and by glass makers has fared the best, but the finer class of stock has shared to some extent in the improvement. Prices did not fluctuate beyond the limits that have marked extremes reached of late, but there is little, if any, positive gain in tone, since discounts are still extremely elastic.

Orange Mineral.—There has been more business in foreign stock for both prompt and near future delivery. The increase is moderate, however, and not sufficient to change the tone of the market. It is easy to buy either large lots or jobbing quantities at the prices that have ruled since the beginning of the year. American brands are unchanged in price and selling slowly.

Zincs.—Quite large deliveries are making of American Oxide on old contracts and the consumption by grinders is probably well up to the average. New business is referred to as being fair, but the orders that come to hand are filled with little ceremony at old prices, and the market, to say the best of it, is barely steady. Foreign brands are without important change in price and meet with merely routine sale.

Colors.—The Paris Green combine announce rebates as follows: 3¢ per lb on lots of 10,000 lbs or over; 2½¢ on lots of 4000 to 10,000 lbs; 2¢ on lots of 2000 to 4000 lbs; 1½¢ on lots of 1000 to 2000 lbs, and 1¢ on lots of 500 to 1000 lbs. The list prices are held in abeyance for the time being. In other Colors nothing of interest has transpired. Business in nearly all the more staple lines has increased somewhat, but not to greater extent than it should at this time, and prices remain almost stationary. There is hardly any change in the market for Oil Colors, or ready mixed Paints, as regards business or prices.

Oils and Turpentine.

Linseed Oil.—The market is still ragged. City crushers hold their prices at 52¢ for raw Oil made from American seed. The Western combined concerns are working harmoniously with that interest. The distinct outside producers still maintain their independence and quote as low as 48¢. Some lots of well known brands are offered quite as cheaply from second hands. Business has increased somewhat in volume, but more could be done without going above the average, and that, in connection with the irregularity in prices, gives the market a somewhat unsettled appearance. Letters from neighboring points are to the effect that competition is as keen there, if not sharper in some instances, than at this point.

Cotton Seed Oils.—Prices for crude Oil declined somewhat early in the week under review, probably to the extent of 1¢ per gallon under the quotations given in last week's report. Some business was done at 25¢ for prime stock, and Oil that was just a trifle "off" went at 24¢ to the extent of several hundred barrels. Prime Summer Yellow was sold at 30¢ to both export and home trade buyers, and other varieties of refined product went at corresponding prices. Quite a good business has been done, but it is apparent that the

market suffers to greater or less extent from excessive supplies, not only in producers' but in speculators' hands.

Lard Oil.—A weak market has been experienced. Buyers of round lots have secured prime City at 60¢ @ 61¢, and ordinary jobbing parcels were placed at only 1¢ @ 2¢ advance on those figures. The weakness was due in a great measure to lively competition between out of town manufacturers, but dullness of trade has doubtless reached the irritating stage. The low grades are down proportionately and seem to be slow sellers at the decline.

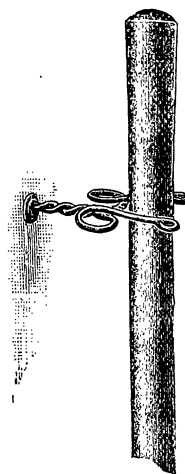
Fish Oils.—There have been no new developments in the market for crude Menhaden. Business is dull, and buyers are very indifferent in view of the fact that business in the refined products is very tame, and that Japanese crude is a more or less important factor. Hardly any new business in crude Sperm or crude Whale Oils has been effected, and the situation is unchanged. The pressed and bleached Oils are moving out at routine pace at barely steady prices. The market for Cod Oil is rather softer, yet showing no radical change.

Miscellaneous.—Common quality Olive Oil in barrels is somewhat weaker in price and rather slow of sale. Spot lots may be secured at 2¢ under the prices that have been asked of late, and forward deliveries at 2¢ @ 3¢ further concession. Coconut Oils are steady at former prices and in very fair demand. There has been no radical change in Red Oils or in Neatsfoot Oil on the spot.

Spirits Turpentine.—Prices are lower by about $\frac{1}{2}$ ¢, and the market is rather flat at the decline. There were sellers at 30½¢ for regular and 31¢ for machine barrels, but the concession failed to stimulate purchases perceptibly. There is nothing new in the general situation.

Standard Broom, Brush and Tool Holder.

This device is being put on the market by the Hamblin & Russell Mfg. Company, Worcester, Mass., and is shown in the accompanying illustration, which represents its shape and use.



Standard Broom, Brush and Tool Holder.

The holder consists of two steel wires which are twisted together in the manner shown. The end of one of the wires is threaded to act as a screw in securing the holder in place. The holders are made tinned and nicked.

Butts With Ball Bearing Washers.

The Stanley Works, New Britain, Conn., and 79 Chambers street, New York, are introducing a new principle as applied to steel butts, as shown in Figs. 1, 2 and 3. Fig. 1 represents a

The Colton Junior Single Track Hanger.

The Munger Colton Mfg. Company, 142 Lake street, Chicago, have just brought out an entirely new single track sliding door hanger, which they have

and runs upon a $\frac{1}{8}$ -inch cold rolled steel axle on a hard maple track. The opening overhead, between soffits, is but $\frac{1}{4}$ inch. The door is easily adjusted after being hung by means of ratchet-nuts which engage in screw threads on

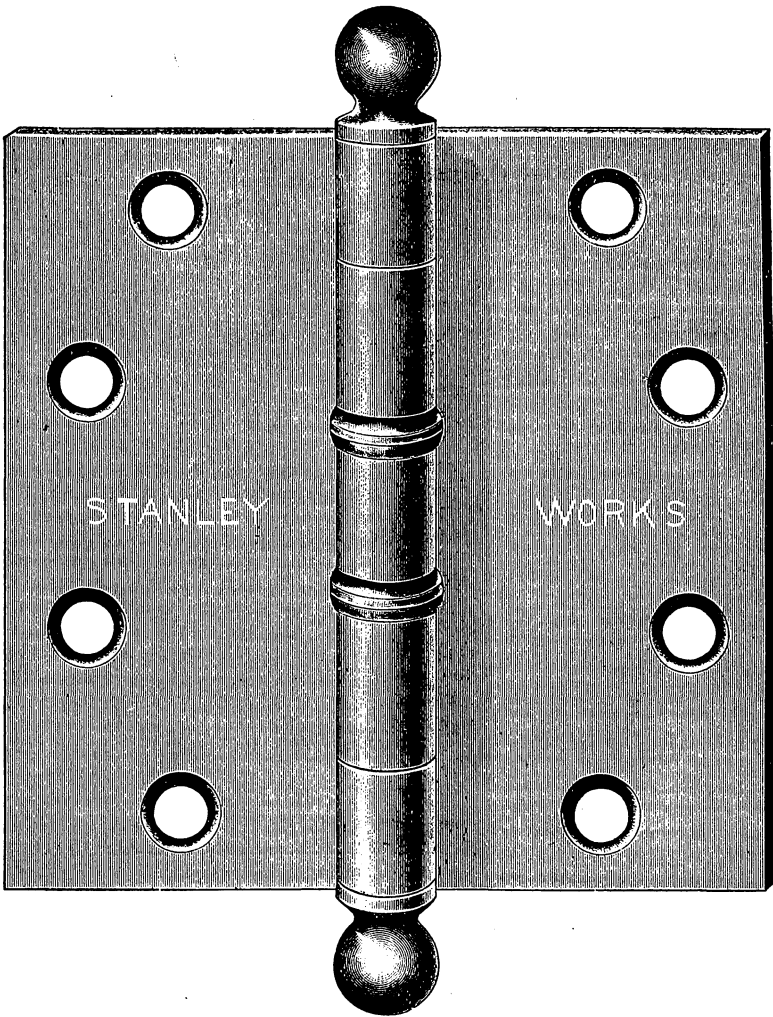


Fig. 1.—Butt with Washers and Ball Bearings.

4 x 4 butt complete with the washers. Fig. 2 shows the washer in detail. Fig. 3 is a cross section of the washer. The main advantages claimed for this construction are minimum amount of friction in the joints with no appreciable

named the Colton Junior. The special features of this hanger will be understood by reference to the illustrations herewith presented. As shown in Fig. 2, the track is slightly beveled, and a bend in the suspension strap causes the tread



Fig. 2.—Detail of Ball Bearing Washer.

wearing down of the butt, even with heavy doors; that there is no need of lubrication involving the use of oil,



Fig. 3.—Cross Section of Washer.

which mars the finish and gathers the dust, while squeaking is avoided. The point is also made that there is no working up of the pin.

of the wheel to conform to the bevel, bringing the center of gravity of the door always directly under the center of the track. A pair of lignum vitæ rolls, better shown in Fig. 1, are also caused by the bend in the strap to run lightly against the face of the guide board, to assure in this way a straight, steady and easy movement of the door.

The hanger is made of steel and malleable iron, except the wheel, which is of gray iron, and the two under rolls, which are of lignum vitæ. The wheel is $3\frac{1}{4}$ inches in diameter on the tread, is babbitted and ground true to center,

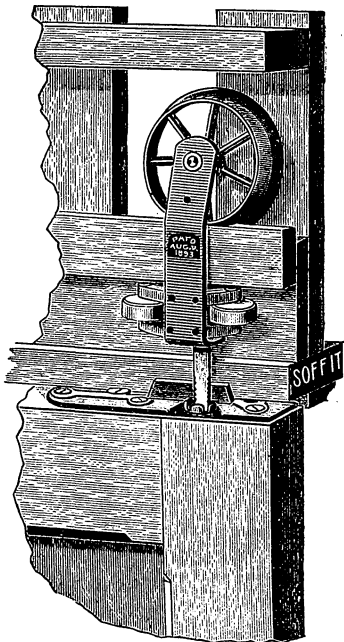


Fig. 1.—The Colton Junior Single Track Hanger.

the lower end of the suspension bar. The hanger is not designed to supersede or conflict with the company's Colton doubletrack hanger, but is intended to meet the demand for hangers of moderate price and yet satisfactory in performance. The hanger described is

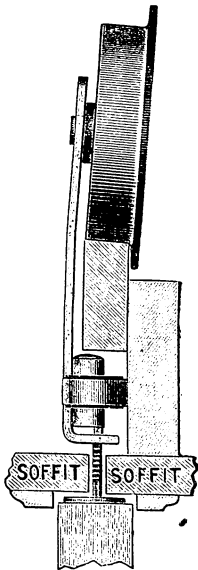


Fig. 2.—Edge View of Colton Hanger.

especially adapted to thin partitions, as it can be made to work perfectly in a partition only 6 inches thick, including lath and plaster. It is packed complete, with screws and architect's full sized working drawings, in wood slide cover boxes.

O. F. SEIBOLD has connected himself with the H. & D. Folsom Arms Company, who have recently removed to 314 Broadway, between Duane and Pearl streets. Mr. Seibold is well known in the firearms and sporting goods trade, having been 16 years with Cooper, Harris & Hodgins, 177 Broadway, and for the last five years with Henry C. Squires, directly opposite.

The National Steel Farm Fence.

Jameson Steel Fence Company, 110 Beekman street, with works at 744-774

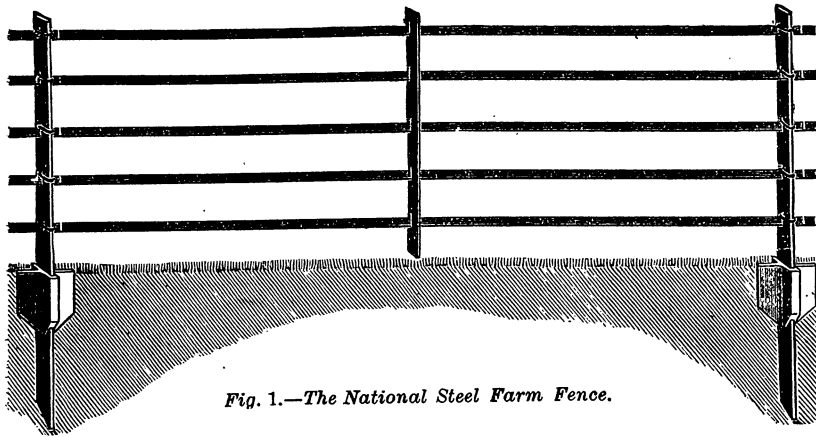


Fig. 1.—The National Steel Farm Fence.

Westchester avenue, New York, are offering the fence shown in the accompanying cuts. Fig. 1 represents a five-

is driven. The angle post, Fig. 5, is set at the starting point, with brace and tie rod in position. The rails at the angle post are secured by screw bolts



Fig. 2.—The Rail.

rail fence made entirely of steel without the use of wood. The rails, Fig. 2, are 14 feet long, $\frac{7}{8}$ inch wide and $\frac{1}{8}$ inch

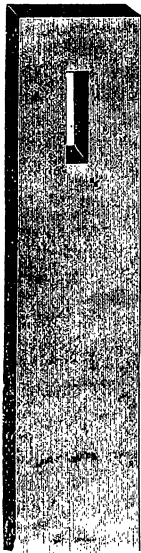


Fig. 3.—The Post.

thick, with a stay in the center to prevent the rails from spreading. The posts, Fig. 3, are $1\frac{1}{2} \times \frac{1}{2}$ inch, to be



Fig. 4.—The Staple.

driven 2 feet or more in the ground, and supported by cast iron shoes 8 inches wide and 9 inches deep, as in Fig. 1, which are slipped over the post after it

fastened by staples, Fig. 4, as shown in Fig. 6. The point is made that ordinary fence staples may be used in case of emergency. The spring post, as shown complete in Fig. 7, is designed to be used at the center of fences having a stretch of from 300 to 400 feet, taking

to keep the fence drawn taut under expansion and contraction due to temperature. The point is made that the spring posts are peculiar to this fence, and prevent looseness and sagging. The manufacturers claim that the fence is easily set, taken up and re-set without injury; that time and ex-

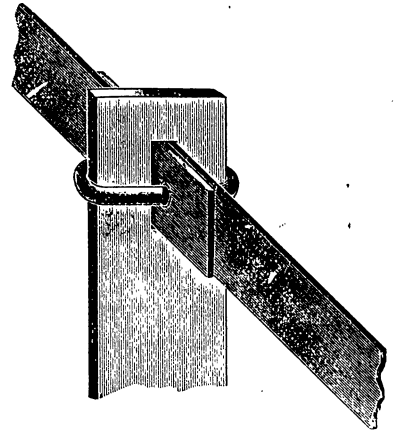


Fig. 6.—Post, Rail and Staple.

pense are saved by driving the posts; that with it a part of a field can be temporarily and securely fenced off in a few hours; that the fence cannot be injured by persons maliciously jumping on the rails or pulling or pushing it; that the breaking strain of each rail is from 5000 to 6000 pounds, and that a five-rail fence would require a force of from 12 to 15 tons to go through it; that the flexibility of the fence acts as a cushion, and the broad smooth surface of the rails cannot cut or scratch.

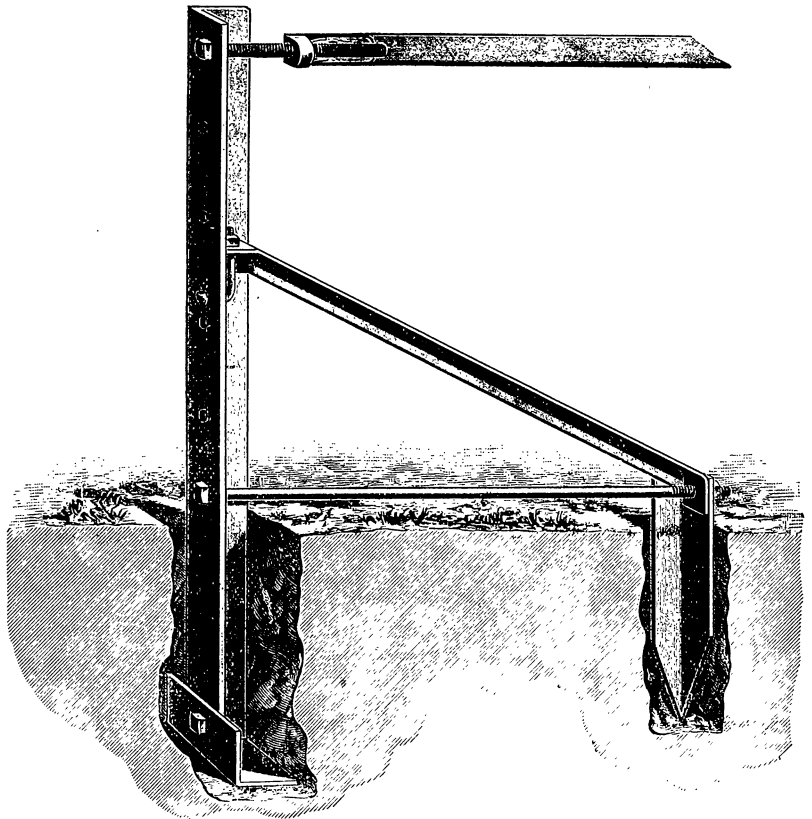


Fig. 5.—End Post and Brace.

the place of the regular post. The post and rail are shown in detail in Figs. 8 and 9, and one should be put, it is explained, between two angle posts when the distance is over 30 or 40 feet. The spring posts are designed

Gates are provided for the fence. The same fence is made with cast iron casings for the posts, or with balls placed on the top of the posts with no casing, to give an ornamental appearance, for use on lawns, &c.

Milk Can for Mule Back.

Iron Clad Mfg. Company, 22-24 Cliff street, New York, are manufacturing a novel milk can for fastening on each side of a mule for transportation in mountainous sections. These are

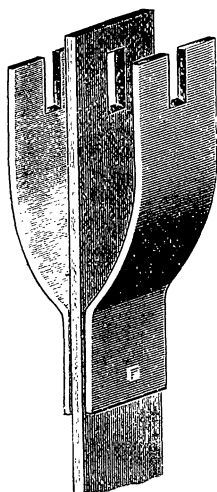


Fig. 8.—Spring Post.

sent principally to South American countries, where the milk dealer serves his customers by this method instead of using a horse and wagon, as with us. The can is 21 inches high, 19 inches long and 9 inches through. The top and bottom are round, while the center on both sides is slightly concave, to fit the mule's sides. They are made in three capacities, 5, 8 and 10 gallons. The material is No. 20 gauge sheet steel, tinned. In the center of the top is a 5 inch round opening, so made as to be absolutely tight, the cover being fitted with a lever and rubber gasket, the whole contrivance projecting about 2 inches above the top of the can. The

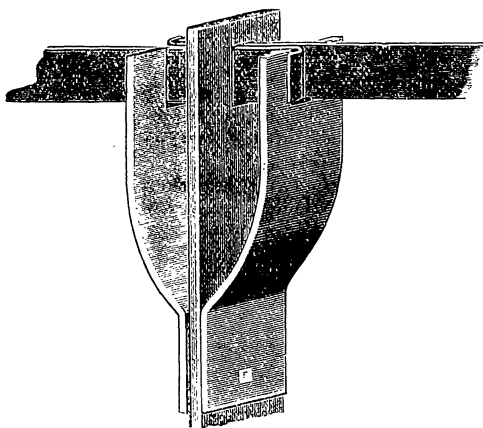


Fig. 7.—Spring Post Complete.

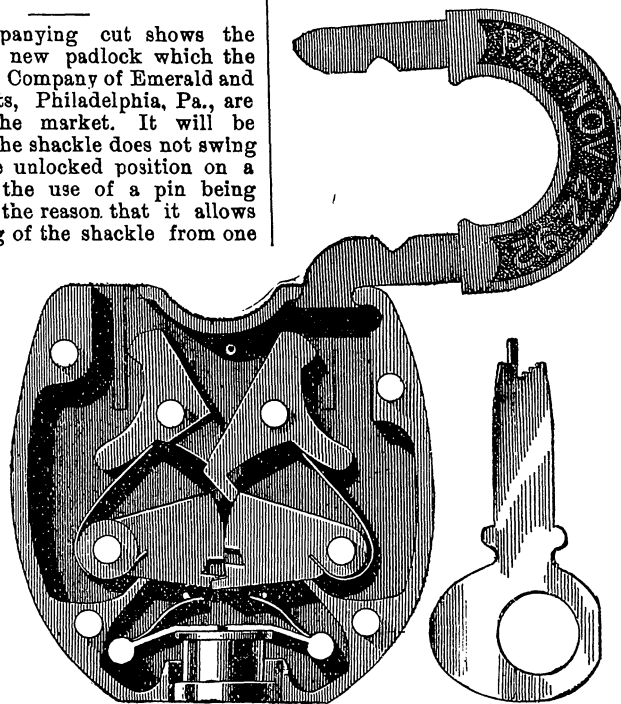
sides extend $\frac{1}{4}$ inch beyond both ends. On the top are two milk can handles, while the bottom has one.

* CHURCH & SLEIGHT, 109 Fulton street, New York, are offering a pattern of Screw Driver for electricians or others who work around electric light or power wires. The blades are made of a fine quality of tool steel, properly tapered and tempered, in sizes from 2 $\frac{1}{4}$ to 6 inches long. These are securely fastened into handles of molded mica, which the patentees claim will insulate against over 2500 volts of electricity.

One pattern of handle is 3 $\frac{1}{4}$ inches long and $\frac{1}{2}$ inch in diameter, with parallel sides and a bead at the blade end to prevent the hand slipping forward. This character of handle is also made in the form usually found in ordinary wooden handles, but without flat sides.

The Schultze Padlock.

The accompanying cut shows the interior of a new padlock which the Schultze Mfg. Company of Emerald and Wishart streets, Philadelphia, Pa., are putting on the market. It will be noticed that the shackle does not swing open into the unlocked position on a pin or pivot, the use of a pin being abolished for the reason that it allows of the locking of the shackle from one



The Schultze Padlock.

side only. The shackle in this lock may be securely locked on both sides. When unlocked it rises to its whole length on both sides simultaneously and perpendicularly out of the lock, and turns over to a horizontal position, resting on one side of the flat upper rim

out effect, and its retraction or extraction would be rendered impossible owing to the grip of the key trap, and should force be used in an effort to remove such strip it would become broken, and opening of the lock be completely prevented. The key trap does not in the least interfere with the free motion of the key. In use a simple pressing back of the shackle into the locked position effects automatic locking without the use of a key. The makers state that picking of this lock would be a most difficult task, owing to the fact that it would have to be picked simultaneously on two sides. Even if one side should be placed in the unlocked position, the other side would still keep the lock securely locked, while the unlocked side would snap back into its locked position as soon as an attempt was made to manipulate the other locked side. Over a million of changes can, it is claimed, be obtained by altering the twist of keyhole and key. The lock is described as being substantially and neatly made, and as possessing a strong and massive shackle.

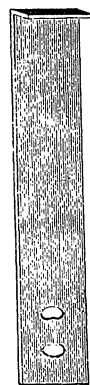


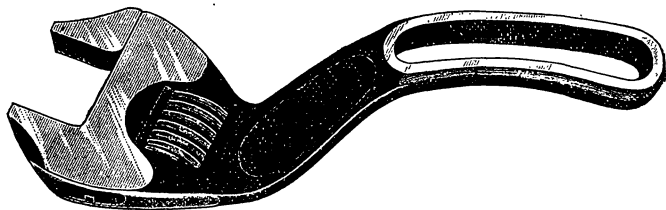
Fig. 9.—Rail for Spring Post.

of the lock, and thus affording the greatest possible opening for a staple or bar when in use. The turning or swinging of the shackle is due to the peculiar shape of one end or leg. The keyhole is in the center or bottom of the lock and is in the form of a rifled or twisted slot. The key is also rifled or twisted so as to fit the keyhole exactly, and the least deviation in a key or other instrument from the shape of the twist of the keyhole will effectually prevent its reaching the interior of the lock. The makers claim that straight keyholes for flat keys, however shaped, always allow of easy access to the inner

ISAAC CHURCH Toledo, Ohio, manufacturer of Church's expansion bolts for fastening all kinds of structure to brick and stone work, has received many testimonials in regard to the value and efficiency of his bolts, in one of which reference is made to the fact that the bolts have been placed by the users within brick walls of every degree of hardness and in concrete floors which were soft and brittle; also that they have been employed to secure wall pipes, both light and heavy, to secure machinery in every variety of position, &c, the bolts proving effective in every case.

Improved Adjustable S Wrench.

Bemis & Call Hardware and Tool Company, Springfield, Mass., are putting on the market the wrench shown in the accompanying illustration. The

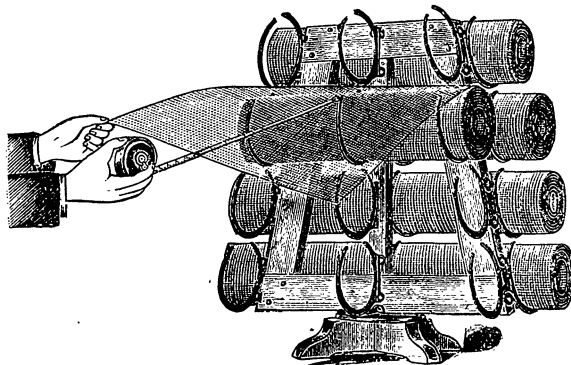


Improved Adjustable S-Wrench.

manufacturers state that the slide of the movable jaw of this wrench by reason of the liberal length of the head on which the fixed jaw rests does not project through the side when the

Wire Cloth Holder.

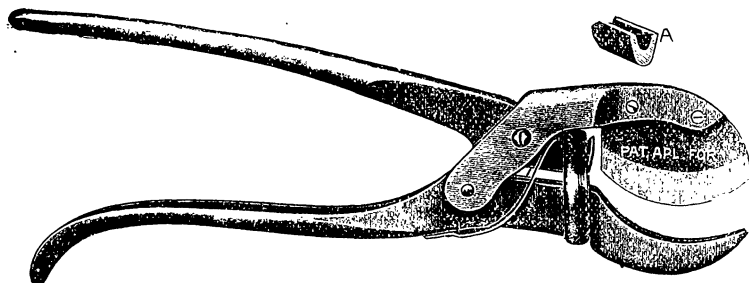
Tempel & Lasar, 2336 Market street, St. Louis, Mo., are manufacturing the wire cloth holder shown herewith. The holder stands 32 inches in height



Wire Cloth Holder.

movable jaw is operated. This provides, it is explained, for a full bearing of the loose jaw on its seat on the head of the wrench, and yet the distance between the jaws is the same as on other S

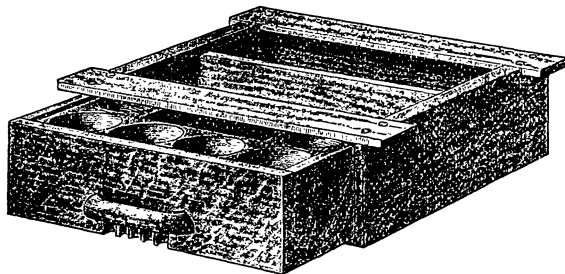
and holds eight rolls of cloth, all in easy reach. It is made of yellow pine, with natural hard wood finish, and the castings are japanned. The frame is made of 1½ x 3½-inch yellow pine,



American Pruning Shear.

wrenches, thus making it strong and durable. It is also mentioned that the jaw operating nut having the knurled or roughened screw threads is of larger diameter than usual, and hence is easily

tenoned and bolted together at every joint. The rings supporting the cloth are of malleable iron. The turntable is made of iron and supports the frame at the center, front, back and both



New Alarm Till.

operated by the thumb. The nut is also accurately constructed for engagement with the rack on the movable jaw support, thus causing a free and accurate movement in adjusting the jaw and obviating all inconvenient binding or friction of the parts.

the holder does not in any way harm the selvage. In measuring cloth the tape line is attached to the ring, as shown, and the cloth is drawn out and measured simultaneously. It is pointed out that the cloth being measured direct from the holder, it requires no

space on the counter, and the use of a yard stick is obviated. It is also stated that as the cloth is measured at the same time it is unrolled, it is cut close up to the holder, and therefore requires no winding back. The holder is described as well made and neat in appearance.

American Pruning Shear.

Gibbs Mfg. Company, Canton, Ohio, are putting this tool on the market, an illustration of it being given herewith. The manufacturers refer to the construction of this shear as such that the leverage is compounded and gives a rapid action which produces a clean cut with exceptional ease. A single blade of fine English steel properly tempered is used, having a central cut, the contact on the lower jaw being milled out and filled with lead to prevent dulling, as shown at A in the illustration. The tool is described as all hand made to templates, thus insuring interchanging of parts.

New Alarm Till.

Waddell Wooden Ware Works, Greenfield, Ohio, are putting on the market the alarm till represented herewith, which will be known to the trade as their No. 2 money drawer. The new feature in this till is the combination lock, which is susceptible, we are advised, of 32 changes, and which the manufacturers describe as follows: Five keys are located under the drawer pull and connect with the same number of tumblers located in the front of drawer and under the sliding tray of coin hoppers. These tumblers connect with five other tumblers, all being on a single wire shaft. To change the combination the sliding tray is pushed back, which operation exposes the whole lock, the tumbler of either combination being lifted and set forward to engage with its adjoining tumbler. The manufacturers claim that the combination may be changed in two seconds without removing a single part of the drawer or lock or taking the drawer out of its slide. The manufacturers also call attention to the fact that everything is intact, which prevents loss of parts in transit. The till is trimmed with a late style cathedral gong which is sounded each time the drawer is opened, so that should an outsider know the combination the alarm is given.

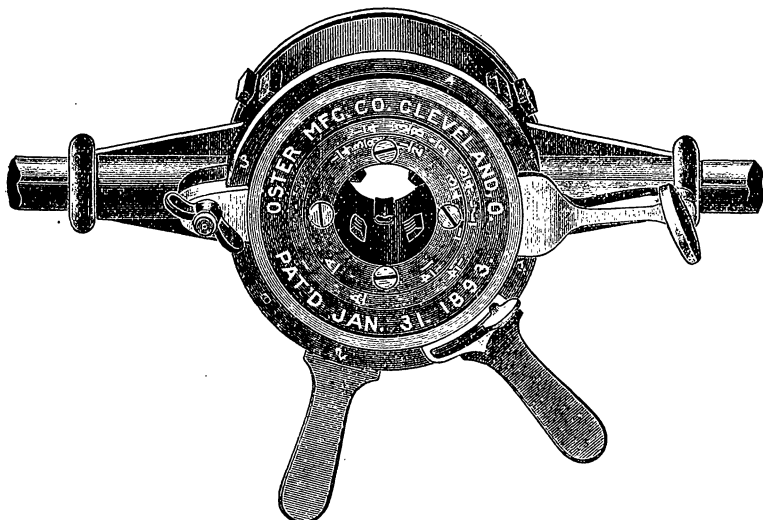
Duplex Wrought Butts.

An interesting feature in the manufacture of butt hinges has been brought more prominently into notice by the purchase within a few months, by the Reading Hardware Co., Reading, Pa., of the entire plant, patents, &c., of the Nashua Butt & Hardware Company, Nashua, N. H. The latter company were makers of duplex wrought bronze and wrought steel butts. The better facilities and opportunities possessed by the Reading Company have enabled them to greatly develop this principle and improve the quality of the goods by the use of fine workmanship and materials in their construction. The advantages claimed for the Duplex butt over those of standard patterns are the introduction of hardened steel bushings and heavy steel pins extending throughout the entire length of barrel in all sizes. This butt is made of double thicknesses of wrought bronze or wrought steel, fastened together in

an ingenious way at the screw holes. The presence of the bushing makes the butt extremely rigid and friction is minimized. Special machines are employed for accurately forming the joints,

two cuts; that a cut off may be included if desired, combining two tools in one—threading and cutting off; that there is no waste of material, and that oil holes give an opportunity of oiling the dies

size without resetting, and that the device for holding the cams in position while threading is positive and warranted not to slip. The dies and guides are operated by a cam movement, having suitable handles to enable the operator to easily adjust them to any desired size. The tool is made in six sizes, for pipe from $\frac{1}{4}$ to 4 inches. Stocks cutting from $1\frac{1}{4}$ to 4 inches have four handles; other sizes have two handles.



The Oster Adjustable Die Stock.

gradually bending them into the proper position by a series of operations which prevents the metal being strained or stretched. This butt is made in sizes ranging from 2 x 2 to 6 x 6 inches.

The Oster Adjustable Die Stock.

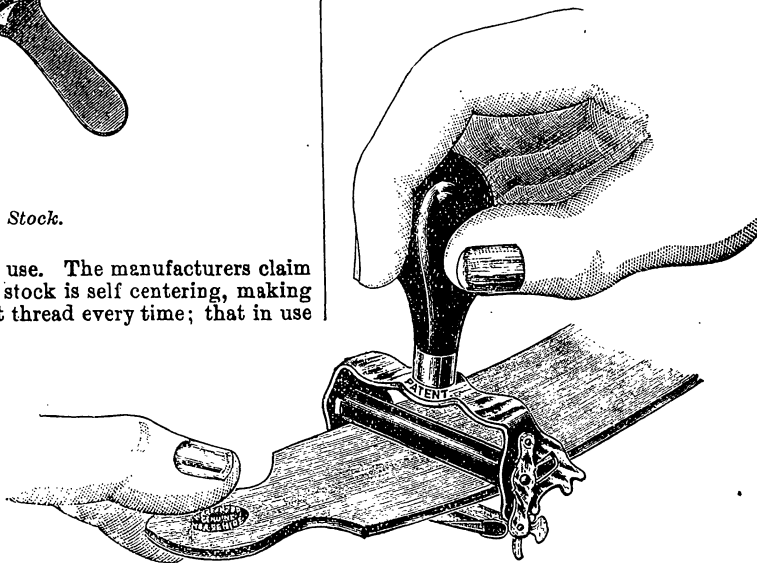
The cut shown herewith is of an adjustable die stock offered by the Oster Mfg. Company, Cleveland, Ohio. The tool is for hand use for threading pipe and bolts, one stock threading from four to six sizes. It is stated that the stock is made of a new process metal, many times stronger than steel in breaking quality, and that the dies are a special brand of fine steel, strong and durable,

while in use. The manufacturers claim that the stock is self centering, making a perfect thread every time; that in use

no turning back over threads is necessary; that the stock is instantly adjust-

Safety Razor Stropping Machine.

E. Lothar Schmitz, manufacturer of the Fox Safety Razor, 92 Reade street, New York, has brought out a new stropping device to be used in connec-



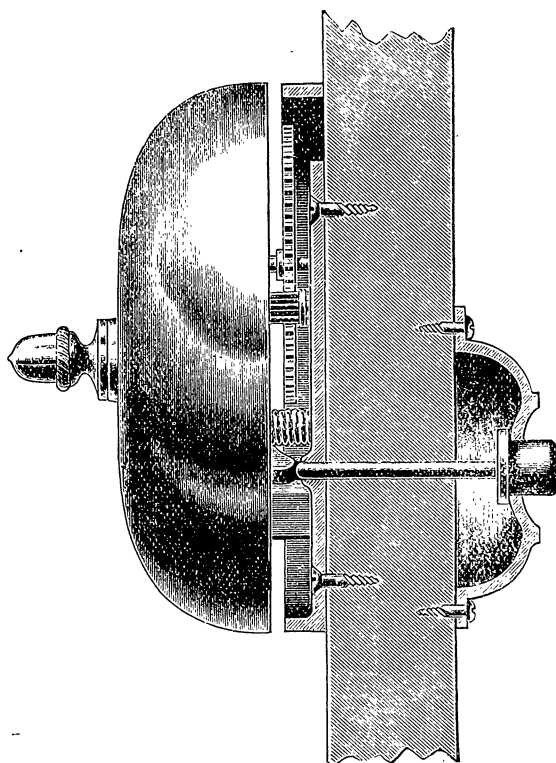
Fox Stropping Machine, Half Size.

tion with safety razors, as here shown. It consists of a nicked frame with a round wooden part fastened rigidly to the center of two side arms, pivoted at the top. These move back and forth, reversing the blade every time the direction of the machine is changed. At the end of the arms is a spring metal receiver for the blade of a safety razor. A slight pressure on the strop, when the machine is in motion, causes the blade to turn always in an opposite direction to which the apparatus is going, making it impossible to cut the strop, and at the same time requiring no skill to sharpen the razor.

Multi-Stroke Door Bell.

The accompanying illustration represents a new door bell, made by the Multi-Stroke Bell Company, New York, for whom Harmon & Dixon, 118 Chambers street, are general agents. This bell is described as producing electric effects without the use of a battery. It is operated by an ordinary push button which, on being pressed, causes a geared segment of a circle to revolve a set of 2 hammers so arranged as to fly out by centrifugal force when in motion, returning to their normal position. It rings both ways, causing, it is said, about 100 vibrations at each pressure, closely resembling an electric bell. It requires no winding, and has no clock springs to get out of order.

THE NUBIAN IRON ENAMEL COMPANY of Cragin, Ill., announce that the second edition of their Nubian calendar is now ready for distribution. It will be mailed on application.



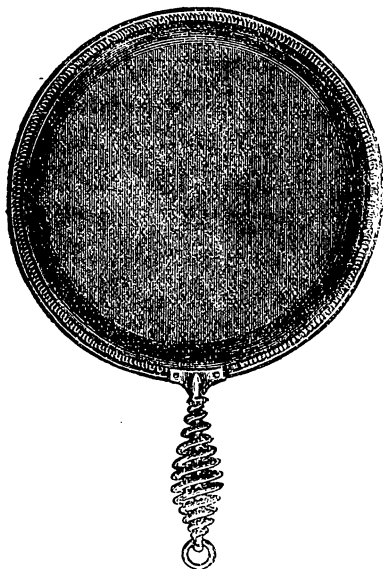
Multi-Stroke Door Bell.

and that they may be sharpened on a grindstone. It is explained that large pipe can be easily threaded by taking

able and removable; that the adjustable positive stop enables the operator to thread any number of pieces of a given

Crown Asbestos Griddle.

Hall & Carpenter, Philadelphia, Pa., are introducing the Crown Asbestos Griddle, as here shown. It consists of a sheet of asbestos covered with a circu-

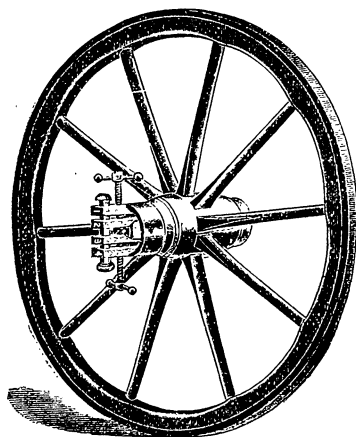


Crown Asbestos Griddle.

lar sheet of steel, which has a single bead around the outer edge, the whole held together by a corrugated tin rim, crimped on so as to hold both firmly together. The handle is of wire, nickeled. The griddle is 9 inches in diameter, and is suitable for a number of purposes where the quantity required is not large, such as frying eggs, mush, hominy, cakes, &c. The placing of asbestos between the fire and metal prevents burning or scorching.

Dolan's Nut Clamp.

The cut herewith shown represents a nut clamp being introduced by A. E. Tenney Mfg. Company, Pawtucket, R. I., for John B. Dolan. The clamp consists of two interior jaws which grasp the nut, and two exterior jaws to grip the inside of the rim of the wheel

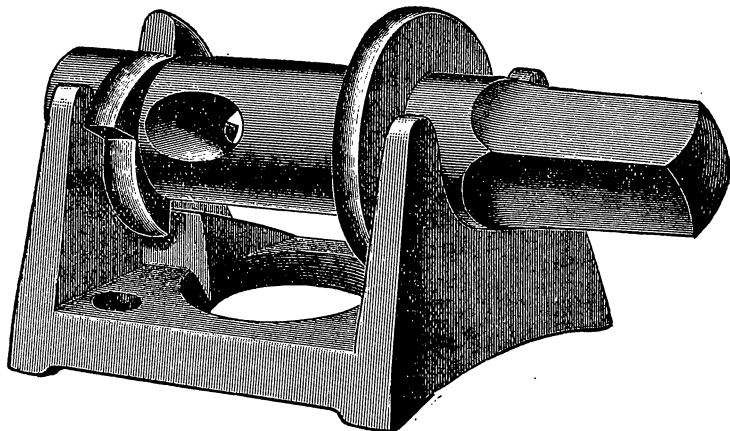


Dolan's Nut Clamp.

hub. The jaws are operated by two independent right and left hand threaded screws, the jaws being kept in line by a square guide spindle passing through them. It is explained that by turning either of the screws the interior jaws are brought nearer together or further apart, according to the direction in which the screw is turned, while the motion of the exterior

jaws is exactly the reverse. A depression or clearance is made in the exterior jaws so that they may grip the interior of the rim of the hub as far from its outer edge as possible or where there is greater strength to resist their action. The clamp is designed to make, for the time being, the axle nut a part of the hub of the wheel, so that revolving the wheel by its spokes in the proper

the rider finds the same motion and position as when riding out of doors, at the same time feeling strictly at home in his own saddle and on the wheel he is accustomed to ride. Bicycle dealers have been impressed with the merits of this device, as it not only serves as a stand but also enables customers to try a wheel in action without leaving the store or soiling the tire. The trainer is



Columbian Wire Fence Tightener.

direction will remove the nut, and revolving it in the opposite direction will secure the nut in place, the nut not having been handled during the operation. The advantages claimed for the clamp are that it may be adjusted to any wheel of ordinary make; that it gives a greater leverage

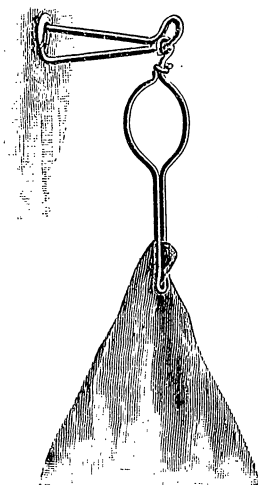
manufactured by the Chicago Home Trainer Company, 1235 Jackson street, Chicago.

Columbian Wire Fence Tightener.

The tightener named above is put on the market by the Columbian Ratchet Company, Goshen, Ind. It is represented in the accompanying illustration. This article is referred to as adapted to either smooth or barb wire and can be operated with an ordinary monkey wrench. It is claimed that it forms a positive self lock that will not jar loose by stock coming in contact with the fence, and that it is readily and easily adjusted in tightening or loosening.

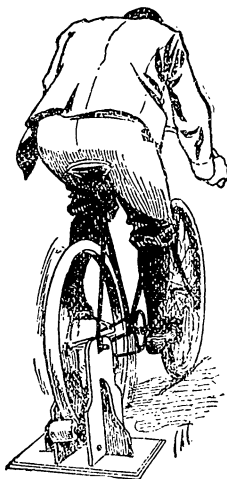
Standard Towel Holder.

Hamblin & Russell Mfg. Company, Worcester, Mass., are putting this article on the market. It is represented in the illustration herewith given, which



Standard Towel Holder.

indicates its construction and the manner in which it is used. The holder consists of two parts, each of which is made of one continuous piece of steel wire. One of the parts is screwed in the wall or partition, the other part or holder proper being suspended from it. The holder is neatly nickeled.



Home Trainer for Bicyclists.

than a wrench; that it obviates the danger of dropping or losing the nut when the wheel is removed, and that it does away with the necessity of handling a greasy nut and soiling hands or clothing.

Home Trainer for Bicyclists.

An illustration is presented herewith of a home trainer for bicyclists which is the invention of A. G. Moore, connected with Hibbard, Spencer, Bartlett & Co., Chicago. The home trainer is constructed with a wooden frame and resembles a bicycle stand, which is in fact one of the uses to which it can be put. Two steps, which fit in notches on top of the stand, are fastened to the rear wheel of the bicycle. The wheel then rests against a ball bearing wooden roller, which is held in place by two strong metal arms reaching from the stand. A spring of considerable tension is attached from the stand to these arms and furnishes the resisting power. When mounted on the wheel

Current Hardware Prices.

MARCH 28, 1894.

Note.—The quotations given below represent the Current Hardware Prices which prevail in the market at large. They are not given as manufacturers prices, and manufacturers should not be held responsible for them. In cases where goods are quoted at lower figures than the manufacturers name, it is not stated that the manufacturers are selling at the prices quoted, but simply that the goods are being sold, perhaps by the manufacturers, perhaps by the jobbers, at the figures named.

The character @ is used to indicate a range of price thus discount 50&10@50&10&5 % signifies that the goods in question are sold at prices ranging from discount 50 and 10 % to discount 50 and 10 and 5 %.

Adjusters, Blind—

Domestic.....\$ doz \$3.00, 33%&10%
Excelsior.....\$ doz \$10.00.....50&10&2%
North's.....\$ doz.....11@11%
Zimmerman's—See Fasteners Blind.

Ammunition—See Caps, Cartridges, Shells, &c.

Anvils—

American—

Eagle Anvil, 10 c. 15@15%
Horse shoe brand, Wrought.....11@11%
Moore & Barnes Mfg. Co.....33%

Imported—

Armstrong Mouse Hole.....10%
S. & H. machine finished.....10%
Trenton.....10%
Wilkinson's.....10%
Peter Wright's.....11@11%

Anvil Vise and Drill—

Allen Anvil and Vise \$3.00.....40&10%
Cheney Anvil and Vise.....25%
Millers Falls Co., \$18.00.....20%
Star.....45&5%

Apple Parers—See Parers

Augers and Bits—

Boring Machine Augers.....70@70&10%
Car Bits, 12-in. twist.....50%
Common Augers and Bits.....70@70&10%
Cincinnati Bell-Hangers' Bits.....30&10%
Forster Pat. Auger Bits.....15%
Jennings' Augers and Bits.....25&10%
Jennings' Pattern Auger Bits.....60%
C. E. Jennings & Co., No. 10, extension
lip.....40%
C. E. Jennings & Co., No. 30.....60%
C. E. Jennings & Co., Auger Bits, set
32% quaters, No. 5, \$5; No. 30, \$3.50, 25%
Russell Jennings' Augers and Bits.....25&10%
Lewis' Patent Single Twist.....45%
L'Hommedieu Car Bits.....15&10%
Pugh's Black.....20%
Pugh's Jennings Pattern.....30%
Snell's Bits.....60&5%

Bit Stock Drills—

Cleveland.....50&10&5%
Cincinnati, for wood.....30&10%
Cincinnati, for metal.....45&10%
Morse Twist Drills.....50&10&5%
New Process Twist Drill Co.....50&10&5%
Standard.....50&10&5%
Syracuse, for metal.....50&10%
Syracuse, for wood (wood list), 30&30&5%

Expansive Bits—

Clark's small, \$18; large, \$26. 35@85&10%
Ives' No. 4, \$ doz. \$60.....40%
Steer's, No. 1, \$26; No. 2, \$18.....35&10%
Stearns' No. 2, \$48.....20%
Swan's.....40%

Gimlet Bits—

Bee.....25@25&5%
Common.....\$ gross \$2.75@85%
Diamond.....\$ doz \$1.25.....40&10%
Double Cut.....30&10%
Ot. Valley Mfg. Co.....30&10%
Hartwell's.....\$ gro., \$10.00.....40&10%
Douglass'.....40&10%
Ives.....60&10&10%
Shepardson's.....45&10&10%

Hollow Augers—

Bonney's Adjustable, \$ doz \$48.....50%
Cincinnati Adjustable.....25&10%
Cincinnati Standard.....25&10%
Douglass'.....33%&33%&10%
French, Swift & Co. (Becher).....33%
Ives'.....33%&33%&10%
Ives' Expansive, each \$4.50.....50&5%
Stearns'.....20&10%
Universal Expansive, each \$4.50.....20%
Wood's.....25@25&10%

Ship Augers and Bits—

L'Hommedieu's.....15&10&15&10&5%
Snell's.....25@25&10%
Snell's Ship Auger Patt'n Car Bits.....15&10&15&10&5%
Watrous'.....25@25&10%

Awl Hafts—See Hafts, Awl.

Awls—

Brad, Handled.....\$ gr. \$2.50@3.00
Brad, Shouldered.....\$ gr. \$1.30@1.40
Peg, Pat.....\$ gr. \$5@5%
Peg, Should.....\$ gr. \$1.50@1.65
Scratch, Handled.....\$ gr. \$4.00@4.50
Scratch, Socket.....\$ doz. \$1.10@1.20

Awl and Tool Sets—See ts, Awl and Tool.

Axes—

	Plain.	Beveled.
First quality, best brands.	\$7.00	\$7.50
First qual., other brands	6.00	7.00
Second quality	5.00	6.00
	5.50	

Axle Grease—See Grease, Axle.

Axles—

No. 1.....3%&4%
Nos. 7 to 14.....4%
Nos. 15 to 28.....4%
Nos. 19 to 22.....7%
Concord Axles, loose collar.....4%
Concord Axles, solid collar.....5%
3% cash

Bag Holders—See Holders, Bag.

Balances—

Sash—
Pullman.....60%
Spring—
Spring Balances.....40@40&10%
No. 2000 20 40
Chatillon, \$ doz.....\$0.80 0.95 1.75 net
Chatillon Straight Balances.....40@40&10%
Chatillon Circular Balances.....50&10%

Barb Wire—See Wire, Barb.

Bars—

Crow—
Cast Steel.....\$ doz \$3%
Iron, Steel Points.....\$ doz \$3%

Basins, Wash—

Standard Fiberglass, No. 1, 10% in., \$1.80;
12-inch, \$2.00; 18% inch, \$2.50; 15-inch,
\$3.00.

Beams, Scale—

Scale Beams, List Jan. 12, '82, 60&10%
Chatillon's No. 1.....60&10&5%
Chatillon's No. 2.....50&10&5%
Custer's.....33%

Beaters—

Egg—
Bryant's.....\$ gross \$14.00
Double (H. & R. Mfg. Co.), \$ gro., No. 0,
\$12.00; No. 1, \$15.00; No. 2, \$18.00.
Dover.....\$ doz \$1.00@1.20
Dover (Standard Co.).....\$ doz \$1.00
Duplex (Standard Co.).....\$ doz \$1.00
Duplex Extra Heavy (Standard Co.).....\$ doz \$1.50
Easy (H. & R. Mfg. Co.).....\$ gro \$12.00
Improved Acme (H. & R. Mfg. Co.).....\$ gro \$9.00
Silver & Co.....\$ doz \$5.50
Spiral.....\$ gro \$4.25 @ \$4.50
Triple (H. & R. Mfg. Co.).....\$ gro \$16.50

Culinary—

Keystone, P. D. & Co., Each, No. 1, \$1;
No. 2, \$2.....20%

Bells—

Cow—
Common Wrought.....60&10%
Kentucky Durham.....70&10%
Kentucky, Sargent's list.....70&10%
Kentucky, "Star".....20&10%
Texas Star.....60&10&5%
Western, Sargent's list.....70&10%

Door—

Crane, Brooks'.....50&10&2%
Crane, Cone's.....10%
Crane, Connell's.....20&10%
Gong, Abbe's.....33%&10%
Gong, Barton's.....40&10&5%
Gong, Yankee.....45&10%
Lever, R. & E. Mfg. Co.'s.....50&10&2%
Lever, Sargent's.....60&10%
Lever, Taylor's Bronzed or Plated, net
Lever, Taylor's Japanned.....25&10%
Pull, Brooks'.....50&10&2%

Electric—

Bigelow & Dowse.....20@20&10%
Wollensak's.....20@20&10%

Hand—

Extra Heavy Brass.....70%
Light Brass.....70&10@70&10&5%
Silver Chime.....33%&10%
White.....70%
Globe Cone's Patent.....25&10&3%

Miscellaneous—

Call.....45&5%
Farm Bells.....\$ doz \$3%
Steel Alloy Church and School Bells.....40%

Bellows—

Blacksmiths'.....60&10&5%
Hand Bellows.....40&10&5%
Molders'.....40&10&5%

Belting, Rubber—

Common Standard.....75@75&10%
Extra.....60&10&5%
Standard.....70&5%
N.Y.B.&P. Co., Carbon.....60&10&5%
N.Y.B.&P. Co., Diamond.....50&5%
N.Y.B.&P. Co., Para.....40&10&5%

Bench Stops—See Stops, Bench

Benders and Upsetters,

Tire—

Detroit Perfected Tire Bender.....15%
Green River Tire Benders and Upset-
ters.....20%
Stoddard's Lightning Tire Upsetters.....15%

Bits—

Auger, Gimlet, Bit Stock Drills, &c.,
see Augers and Bits.

Bit Holders—See Holders.

Blind Adjusters—See Ad-

justers, Blind.

Blind Fasteners—See Fasten-

ers, Blind.

Blind Staples—See Staples,

Blind.

Blocks—

Cleveland Block Co., Mal. Iron. 50&10&60%
Moore Novelty, Mal. Iron.....50%
Sue Grip Steel Tackle Block.....25%
See also Machines, Hoisting.

Bolts—

Carriage, Machine, &c.—

Com. list June 10, '84.....80&10&80&10&5%
Genuine Eagle, Norway, list Oct. '84.....80&10&80&10%
Eagle, Norway, list Oct. '84.....80&10&80&10%
Phila. pattern, list Oct. 7, '84.....80%
R.B. & W., old list.....70%
Bolt Ends, list Jan. 1, 1890, 80&10&80&10&5%
Machine, list Jan. 1, 1890, 80&10&80&10&5%

Door and Shutter—

Cast Iron Barrel, Square, &c.....75&10%
Cast Iron Chain (Sargent's list).....65&10&65&10&5%
Cast Iron Shutter Bolts.....75&10%
Ives' Patent Door Bolts.....60&10&60&10&10%
Wrought Barrel.....76&75&5%
Wrt B. K. Flush, Common.....55&10%
Wrt Shutter, Brass Knob 50&10&50&10&5%
Wrt Shutter, Sargent's list.....60&10%
Wrt Shutter, all iron, Stanley's.....60&10&60&10&10%
Wrought Square.....75&5%
Wrt Sunk Flush, Sargent's list.....60&10%
Wrt Sunk Flush, Stanley's list.....50&10&10%

Stove and Plow—

Plow.....60&10&5%
Stove.....60&10&60&10&10%
R. B. & W., Plow.....55%

Tire—

Common, list Feb. 28, '83.....65&65&10%
American Screw Company.....75%
Norway, Phila., list Oct. 16, '84.....80%
Eagle, Phila., list Oct. 16, '84.....80%
Phila., list Oct. 16, '84.....80%
Bay State, list Feb. 28, '83.....65%
Port Chester Bolt and Nut Company.....65%
Empire list Feb. 28, '83.....80%
Keystone, Philadel., list Oct. '84.....80%
Norway, Phila., list Oct. '84.....75%
R. B. & W., Philadel., list Oct. 16, '84.....80%

Borers, Tap—

Common and Ring.....20&10%
Clark's.....33%
Enterprise Mfg. Co.....20%
Ives' Tap Borers.....33%&5%

Boring Machines—See Ma-

chines, Boring.

Bow Pins—See Pins, Bow.

Boxes, Wagon—

Per lb.....25%

Boxes, Miter.

Spilker's Excelsior, 3 in. \$7.50, 4 in.
\$8.50, 5 in. \$13.00, 6 in. \$15.00.....20%

Braces—

American Bit Brace and Tool Co.....50&10%
No. 10, 12, 20.....70&10%
Nos. 11, 21, 24, 27.....70&10%
Nos. 22, 23, 25.....60&10&5%
Nos. 13, 26, 36, 37.....70&10&5%
Amidon's.....75&10&80%
Barker's Imp'd Plain.....75&10&80%
Barker's Imp. Nickeled.....65&10&70%
Ratchet.....75&10&80%
Eclipse Ratchet.....80%
Globe Jawed.....40&40&10%
Corner Brace.....40&40&10%
Universal, 3 in., \$2.10; 10 in. \$2.25
Buffalo Ball.....\$1.10@1.15
Bartholomew.....60&10%
Nos. 25, 27 and 30.....50&10&60&5%
Nos. 117, 118, 119.....70&70&5%
Common Ball, American.....\$1.00@1.10
Davis Patent.....50&10%
Fray's Genuine Spotted.....50&5%
Fray's Nos. 70 to 120, 81 to 123, 207 to 415
Ives' New Haven Novelty.....70&70&5%
New Haven Ratchet.....60&5%
Barber Ratchet.....60&5%
Barber's.....60&5%
Spotted.....60&5%
P. & W. Co., Lock's Patent.....60%
Rose & Johnson.....50%
Saxton's.....75&10&80%
Barker's Imp. Polished.....75&10&80%
Barker's Imp. Nickeled.....65&10&70%
Ratchet, Polished.....50&10&60%
Ratchet, Nickeled.....40&10&50%
Buffalo Ball.....net, \$1.10@1.15

Brackets—

Shell, fancy.....70&70&10%
Sargent's list.....70&70&10%
Other makes at a wide range of prices.
Shelf, plain.....65&70%
Regular, list.....60&10&70&10%
Sargent's list.....60&10&70&10%
Bradley Shelf Brackets.....70&10%

Bright Wire Goods—See

Wire.

Broilers—

Hens' Self.....9 10 9x11
Baking, Per doz.....\$4.50 5.50 6.50
Morgan Odorless.....\$ doz \$12, 50%
New Haven.....50%
Queen City.....33%
Wire Goods Co.....65&10%

Buckets, Well—

Calvanized—

Hill's.....\$ doz 12 qt. \$4.25; 14 qt. \$5.25
Iron Clad.....\$ doz 14 qt. \$4.25@4.50

Bull Rings—See Rings, Bull.

Butcher's Cleavers—See

Cleavers, Butchers.

Butts—

Brass—

Cast Brass, Fast.....33%
Cast Brass, Loose Joint.....33%
Cast Brass, Tiebout's.....50%
Wrought Brass.....80&10&80&10&5%

Cast Iron—

Fast Joint, Broad.....60@60&5%
Fast Joint, Narrow.....60@60&5%
Loose Joint.....75&10%
Loose Joint, Japanned.....10%
Loose Joint, Jap. with Acorns.....80%
Loose Pin, Acorns, Japanned.....75&10%
Loose Pin, Acorns, Japanned.....80%
Plated Tips.....75&10%
Mayer's Hinges.....75&10%
Parliament Butts.....75&10%

Wrought Steel—

Fast Joint, Broad.....60@60&5%
Fast Joint, Narrow.....60@60&5%
Fast Joint, Lt. Narrow.....75&10%
Inside Blind, Light.....75&10%
Inside Blind, Regular.....75&10%
Loose Joint, Broad.....75&10%
Loose Pin.....75&10%
Table Butts, Back Flaps, &c.....75&10%
Bronzed Wrought Butts 50&10&50&10&10%
List Jan. 2, 1893, 50@60&5%

Cages, Bird—

Hendryx, Brass.....10@50%
Hendryx, Enameled.....40&10&50%

Callipers—See Compasses

Calks Toe—

Burke's, One Prong, Blunt.....4%
Burke's, One Prong, Sharp.....5%
Burke's, Two Prong, Blunt.....5%
Burke's, Two Prong, Sharp.....5%
Gautier, One Prong, Blunt.....5%
Can Openers—See Openers, Can.

Cans, Milk—

S. & Co., 5-gal., \$3.00; 8-gal., \$4.40;
10-gal., \$4.75 each.....40&10%

Cans, Oil—

Galvanized Blue Band, 1 gal., \$ doz. \$2.35
Galvanized Blue Band, 5 gal., Tip-Top,
\$ doz. \$12.00
Galvanized Blue Band, 5 gal., Faucet,
\$ doz. \$3.00
Glass Oil, Friend.....\$ doz. \$3.75

Caps—

Percussion—

Hicks & Goldmark's and Union Metallic
Cartridge Co.....100%
Eley's E. B.....50&50%
Eley's D. Waterproof, Central Fire, \$1.00
E. B. Grnd. Edge, Cent. Fire, 1-10's.....47&50%
E. B. Trimm'd Edge, 1-10's.....47&50%
F. L. Waterproof, 1-10's.....35&50%
G. D.....70&70%
Musket, Waterproof, 1-10's.....50&50%
S. B. Genuine Imported.....45%

Primers—

Berdan Primers, \$1.00.....25%
B. L. Caps (Sturtevant Shells) \$1.00.....25%
A. Other Primers, \$1.20.....25%

Cards—

Watson's Cotton, Wool, Horse and
File, list January 28, 1891.....25%

Carpet Stretchers—

See Stretchers, Carpet.

Cartridges—

B. B. Caps, Con. Ball, Swgd., \$1.85@1.90
B. B. Caps, Round Ball.....\$1.60@1.65
Blank Cartridges, except 22 and 32 cal.,
additional 10% to above discounts.
Blank Cartridges, 22 cal., \$1.75.....25%
Blank Cartridges, 32 cal., \$3.50.....25%
Cent. Fire, Military and Sporting.....15&5%
Cent. Fire, Pistol and Rifle.....25&5%
Primed Shells and Bullets.....15&5%
Rim Fire Cartridges.....60&5%
Rim Fire Military.....15&5%

Carpet Sweepers—

See Sweepers, Carpet.

Casters—

Bed Plate.....Brass.....55@55&10%
Shallow Socket.....Others.....60@60&10%
Deep Socket.....40&10%
Giant Truck Casters.....35%
Gwinner's Common Sense.....45%
Gwinner's Hercules.....45%
Martin's Patent (Phoenix) 45&10@60&10%
Payson's Anti-friction.....70@70&10%
Payson's Truck.....60@60&10%
Socket Truck Casters.....60@60&10%
Stationary Truck Casters.....60&10%
Tucker's Patent, low list.....45%
Yale Casters, low list.....45%
Yale, Genl.....70%

Cattle Leaders—

See Leaders, Cattle.

Cement—

Victor Elastic.....5 lb pails 50%

Chalk Lines—See Lines.	
Checks, Door—	
Unity	50%
Chisels—	
Socket Framing and Firmer	
Mix	75%100%75%100%10%
Ohio Tool Co.	
P. S. & W.	
Wetherby	
Buck Bros.	30%
Charles Buck.	30%
Donlass.	75%100%
Merrill.	60%100%80%100%
L. & J. White.	30%20%5%
Tanged and Miscellaneous.	
Buck Bros.	30%
Charles Buck.	30%
Butchers.	\$4.75 to \$5.00 to 30%
Spears & Jacksons.	\$5 to 2
Tanged Firmers.	50%50%10%
Cold Chisels, fair quality, 7 in.	14 to 16%
Chucks—	
Beach Pat.	each, \$8.00, 20%
Danbury.	each, \$6.00, 30% to 50%
Graham Patent.	35%
Moore's Adjustable, each.	\$7.00, 20% to 25%
Syracuse, 10 in. P. S.	25%
Skinner's Patent Chucks.	
Combination Lathe Chucks.	38 1/2%
Drill Chucks.	15%
Independent Lathe Chucks.	40%
Universal Lathe Chucks.	40%
Union Mfg. Co.	
Combination.	40%
Independent.	40%
Universal.	40%
Victor.	\$3.50, 25%
Churns—	
McDermald, Star Barrel Churn, each	6 gal., \$2.00, 10 gal., \$2.75; 15 gal., \$3.00; 20 gal., \$3.25
Tiffin Union, each, 5 gal. \$3.25; 7 gal., \$3.75; 10 gal., \$4.25.	
Clamps—	
Adjustable, Cincinnati.	15%10%
Adjustable, Stearns.	30%30%10%
Barnes' Machine's Clamps.	70%10%
Cabinet, Sargent's.	70%10%
Carpenter's, Cincinnati.	25%10%
Carriage Makers', P. S. & W. Co.	40%10%
Carriage Makers', Sargent's.	75%75%85%
Eberhard Mfg. Co.	40%5%40%10%
R. I. Tool Co.'s Wrought Iron.	25%
Saw Clamps, see Vices, Saw Filers.	
Stearns' Malleable, with Wrought Iron	
Screw.	75%75%85%
Warner's.	40%10%40%10%85%
Cleavers, Butchers'—	
Beatty's.	40%40%5%
Bradley's.	25%30%
Forster Bros.	30%
New Haven Edge Tool Co.'s.	30%
Nichols Bros.	30%
P. S. & W.	35%40%35%10%
Schulte, Lohoff & Co.	40%40%85%
L. & J. White.	20%85%
Clips—	
Baker Axle Clips.	25%
Norway, Axle.	50%
Norway Spring Bar Clips, 5-16.	80%85%85%
2d grade Norway Axle 5-16.	65%85%
Steel Felloe Clips.	70%
Superior Axle Clips.	70%
Wrought Iron Felloe Clips.	70%
Cloth and Netting, Wire	
See Wire, &c.	
Cocks, Bass	
See Hardware List, Globe, Kerosene, Lever	
Bibbs, Racking, &c.	
Coffee Mills—See Mills, Coffee.	
Collars, Dog—	
Brass, Pope & Stevens' list.	40%
Chapman Mfg. Company, new list.	40%
Embossed, Gilt, Pope & Stevens' list	30%10%
Leather, Pope & Stevens' list.	40%
Medford Fancy Goods Co.	40%10%50%
Combs, Curry	
American Curry Comb Co.	35%40%
Fitch's.	50%10%50%10%10%
Gibbs' Magnetic.	50%10%
Kohler's Humane.	50%10%
Kohler's Magic Oscillating.	50%10%
Rubber, per doz.	\$10.00, 25%
Compasses, Dividers &c.	
Compasses, Dividers, Dividers, 70%10%75%	
Bemis & Call Co.	
Dividers.	
Callipers, Call's Patent Inside.	55%
Callipers, Double.	55%
Callipers, Inside or Outside.	55%
Callipers, Wing.	50%
Excelsior.	50%85%
Starrett's.	50%
Combination Dividers.	25%
Lock Callipers and Dividers.	25%
Spring Callipers and Dividers.	25%10%
Stevens & Co.'s.	25%10%
Coopers' Water	
P. S. & W. Co., 2 gal. 2 gal., \$2.50;	
4 gal., \$2.75; 6 gal., \$3.40 each.	33%
Coopers' Tools—	
See Tools, Coopers'.	
Cord—Sash—	
Braided, Crown Drab and Fancy, 7	80%
in 55.	
Braided, Crown White, 7 in 50.	50%
Cable Laid Italian Sash.	19%20%
Common.	8%20%
Common Russia Sash.	12%18%
Egyptian, India Hemp, Braided.	25%
India Cable Laid Sash.	11%12%
Massachusetts, White.	25%
Ossawaun Mills—	
Braided, Giant, Drab and Fancy, 7	10%
in 55.	
Braided, Giant, White, 7 in 30.	20%
Patent, good quality.	10%12%
Patent Russia Sash.	13%14%
Samson—	
Braided, Drab Cotton.	42%
Braided, Italian Hemp.	40%
Braided, Linen.	50%
Braided, White.	37%
Semper Idem, Braided, White.	25%
Silver Lake—	
A quality, Drab, 55.	25%
A quality, White, 50.	25%
B quality, Drab, 35.	10%
B quality, White, 30.	10%
Sylvan Spring, Extra Braided, Drab.	39%
Sylvan Spring, Extra Braided, White.	34%
Tate's Solid Braided—	
Economy, Drab.	27%
Economy, White.	25%
Hercules, Drab.	30%
Hercules, White.	25%
White Cotton Braided, fair.	23%24%
Wire Picture—	
Braided or Twisted.	80%50%80%15%
Corkscrews—See Screws, Cork.	
Corn Knives and Cutters	
See Knives, Corn.	
Crackers, Nut—	
Acme.	
Jannaped, 7 gro., \$30.	50%
Nickel Plated, 7 gro., \$30.	10%
Blake's Patent, 7 doz., \$2.00.	10%
Table (H. & B. Mfg. Co.).	40%
Turner & Seymour Mfg. Co.	50%
Cradles—	
Grain.	50%20%50%5%2%
Crayons—	
White Crayons, 7 gross.	7@8¢
D. M. Steward Mfg. Co.	
Metal Workers', 7 gross, \$2.50.	25%
Railroad, 7 gross.	2.00
Rolling Mill, 7 gross.	2.50
Soapstone Pencils, 7 gross, 1.50.	25%
See also Chalk.	
Creamery Pails—See Pails,	
Creamery.	
Crow Bars—See Bars, Crow.	
Curry Combs—	
See Combs, Curry.	
Curtain Pins—	
See Pins, Curtain.	
Cutters—	
Meat—	
American.	30%
Nos. 1 2 3 4 5	
Each.	\$5 \$7 \$10 \$25 \$50 \$80
Enterprise.	10 12 22 32 42
Nos. 10 12 22 32 42	
Each.	\$3 \$2.50 \$4 \$5 \$15
Dixon's, 7 doz.	40%40%5%
Nos. 1 2 3 4 5	
Draw Cut, each.	\$14.00 \$17.00 \$19.00 \$30.00
Nos. 5 6 8	
Each.	\$50 \$75 \$80 \$225
Hale's, 7 doz.	70%
Nos. 11 12 13	
Home No. 1, 7 doz.	\$27.00 \$33.00 \$45.00
Little Giant, 7 doz.	55%10%
Nos. 305 310 312 320 322	
Each.	\$35.00 \$48.00 \$44.00 \$72.00 \$88.00
Miles' Challenge, 7 doz.	45%45%10%
Nos. 1 2 3 4 5	
Triumph No. 505, 7 doz.	\$22.00 \$30.00 \$40.00
Woodruff's, 7 doz.	\$21.00, 25%30%
Nos. 100 150	
Each.	\$15.00 \$18.00
Chadborn's Smoked Beef Cutter, 7 doz.	\$68.00
Enterprise Beef Shavers, 7 doz.	20%
Tucker & Dorsey Mfg. Co.—	
Kraut Cutters, 1 Knife, 7 gross, \$21.00;	
Slaw Cutters, 2 Knife, 7 gross, \$30.00	
Tobacco	
Acme.	7 doz., \$20.00, 40%
All Iron.	7 doz., \$4.25
Champion.	20%10%
Nashua Look Co.'s.	7 doz., \$18.00, 50%55%
National.	7 doz., \$21.00, 30%
Sargent's.	7 doz., \$24.00, 55%10%
Wilson's.	55%
Washer—	
Appleton's.	7 doz., \$16.00, 80%10%
Bonney's.	50%10%
Champion.	55%10%
Johnson's.	7 doz., \$11.00, 33%4%
Penny's.	7 doz., \$14.14; Jap'd, \$16.55%
Smith's Pat.	7 doz., \$12.00, 20%10%10%
Diggers, Post Hole, &c.—	
Cronk's Post Bars, 7 doz., \$60.00,	
50%50%50%10%	
Eureka Diggers.	7 doz., \$12.00, \$13.00
Fletcher Post Hole Augers.	7 doz., \$20.00, 10%
Gem, Improved, 7 doz., \$9.00, \$10.00, net	
Gibbs' Columbia.	7 doz., \$12.00
Gibbs' Hustler.	7 doz., \$12.00
Gibbs' Imperial.	7 doz., \$7.50
Gibbs' National.	7 doz., \$12.00
Gibbs' Post Hole Digger.	7 doz., \$12.75
Kohler's Hercules.	7 doz., \$14.00
Kohler's Invincible.	7 doz., \$12.00
Kohler's Little Giant.	7 doz., \$18.00
Kohler's New Champion.	7 doz., \$8.00
Samson, 7 doz., \$34.00.	25%25%10%
Schneider.	7 doz., \$18.00
Shimer's Hollow Handle.	7 doz., \$22.00, 50%
Vaughan's Post Hole Auger, 7 doz.	\$8.50, \$9.50
Dividers—See Compasses.	
Dog Collars—See Collars, Dog.	
Door Checks—	
See Checks, Door.	
Door Springs—	
See Springs, Door.	
Drawers.	
Money, 7 doz.	\$13@20
Wadell's Improved, No. 1, 7 doz.	\$15.00
Wadell's Improved, No. 2, 7 doz.	\$18.00
Wadell's Desk and Drawer, each.	\$7.50
Wadell's Desk and Show case, each.	\$7.50
Drawing Knives—	
See Knives, Drawing.	
Drills and Drill Stocks—	
Bench Drills, Stearns.	50%
Blacksmiths.	each \$1.75
Blacksmiths' Self-Feeding, each	\$7.50, 20%
Automatic Boring Tools.	\$1.75@1.85
Breast, Bartholomew's.	each \$2.50
75%10%40%	
Breast, Millers Falls.	each \$5.00, 25%
Breast, P. S. & W.	each 40%10%
Breast, Wilson's.	30%5%
Chicopee Automatic Drill.	20%10%
Goodell Automatic Drills.	40%5%
Ratchet, Curtis & Curtis.	30%
Ratchet, Ingersoll's.	20%
Ratchet, Merrill's.	20%20%
Ratchet, Moore's Triple Action.	25%30%
Ratchet, Parker's.	20%20%5%
Ratchet, Weston's.	20%25%
Ratchet, Whitney's.	20%10%
Whitneys Hand Drill, Plain,	\$11.00;
Adjustable, \$12.00.	20%10%
Twist Drills—	
Cleveland, W. & B.	50%10%10%
Diamond, W. & B.	50%10%10%
Graham's Pat. Groove Shank.	50%10%10%
More.	50%10%10%
New Process.	50%10%10%
Standard.	50%10%10%
Syracuse (Metal List).	50%10%
Drill Bits or Bit Stock	
Drills—See Augers and Bits.	
Drill Chucks—See Chucks.	
Dripping Pans—	
See Pans, Dripping.	
Drivers, Screw—	
Allard's Spiral, new list.	25%
Brace Screw Drivers.	25%10%
Buck Bros.	30%
Buck Bros.' Screw Driver Bits.	27%85%
Clark's Pat.	30%39%
Cincinnati.	25%10%
Champion.	25%10%
Diston's.	50%
Douglas Mfg. Co.	20%20%10%
Elrich's Socket and Ratchet.	25%25%10%
Fry's Pol. H. die Sets, No. 3,	\$12.00, 45%
Gay & Parsons.	35%
Goodell's Automatic.	50%
Knap & Cowles	
No. 1.	70%10%
No. 2.	70%10%
No. 3.	80%10%
No. 4.	80%10%
No. 5.	80%10%
No. 6.	80%10%
No. 7.	80%10%
No. 8.	80%10%
No. 9.	80%10%
No. 10.	80%10%
No. 11.	80%10%
No. 12.	80%10%
No. 13.	80%10%
No. 14.	80%10%
No. 15.	80%10%
No. 16.	80%10%
No. 17.	80%10%
No. 18.	80%10%
No. 19.	80%10%
No. 20.	80%10%
No. 21.	80%10%
No. 22.	80%10%
No. 23.	80%10%
No. 24.	80%10%
No. 25.	80%10%
No. 26.	80%10%
No. 27.	80%10%
No. 28.	80%10%
No. 29.	80%10%
No. 30.	80%10%
No. 31.	80%10%
No. 32.	80%10%
No. 33.	80%10%
No. 34.	80%10%
No. 35.	80%10%
No. 36.	80%10%
No. 37.	80%10%
No. 38.	80%10%
No. 39.	80%10%
No. 40.	80%10%
No. 41.	80%10%
No. 42.	80%10%
No. 43.	80%10%
No. 44.	80%10%
No. 45.	80%10%
No. 46.	80%10%
No. 47.	80%10%
No. 48.	80%10%
No. 49.	80%10%
No. 50.	80%10%
No. 51.	80%10%
No. 52.	80%10%
No. 53.	80%10%
No. 54.	80%10%
No. 55.	80%10%
No. 56.	80%10%
No. 57.	80%10%
No. 58.	80%10%
No. 59.	80%10%
No. 60.	80%10%
No. 61.	80%10%
No. 62.	80%10%
No. 63.	80%10%
No. 64.	80%10%
No. 65.	80%10%
No. 66.	80%10%
No. 67.	80%10%
No. 68.	80%10%
No. 69.	80%10%
No. 70.	80%10%
No. 71.	80%10%
No. 72.	80%10%
No. 73.	80%10%
No. 74.	80%10%
No. 75.	80%10%
No. 76.	80%10%
No. 77.	80%10%
No. 78.	80%10%
No. 79.	80%10%
No. 80.	80%10%
No. 81.	80%10%
No. 82.	80%10%
No. 83.	80%10%
No. 84.	80%10%
No. 85.	80%10%
No. 86.	80%10%
No. 87.	80%10%
No. 88.	80%10%
No. 89.	80%10%
No. 90.	80%10%
No. 91.	80%10%
No. 92.	80%10%
No. 93.	80%10%
No. 94.	80%10%
No. 95.	80%10%
No. 96.	80%10%
No. 97.	80%10%
No. 98.	80%10%
No. 99.	80%10%
No. 100.	80%10%
No. 101.	80%10%
No. 102.	80%10%
No. 103.	80%10%
No. 104.	80%10%
No. 105.	80%10%
No. 106.	80%10%
No. 107.	80%10%
No. 108.	80%10%
No. 109.	80%10%
No. 110.	80%10%
No. 111.	80%10%
No. 112.	80%10%
No. 113.	80%10%
No. 114.	80%10%
No. 115.	80%10%
No. 116.	80%10%
No. 117.	80%10%
No. 118.	80%10%
No. 119.	80%10%
No. 120.	80%10%
No. 121.	80%10%
No. 122.	80%10%
No. 123.	80%10%
No. 124.	80%10%
No. 125.	80%10%
No. 126.	80%10%
No. 127.	80%10%
No. 128.	80%10%

Plato.....\$34.25
 Bomer's Night Latches.....15¢
 R. & E. Mfg. Co., list Mar. 30, 1889.....
 Sargent & Co., list Aug. 1, 1891.....60¢
 Warner's Burglar Proof, # doz. \$8.00, 60¢
 Yale.....net prices

Elevator—

Moore's.....33½¢

Padlocks—

Wrought Iron Padlocks—
 Brittan, Graham & Mathes, list Jan. 1894.....75¢
 Mallory, Wheeler Co., list January 1, 1894.....75¢
 Norwich Lock Mfg. Co., list June 10, 1891.....50¢
 Russell & Erwin Mfg. Co., list June 10, 1891.....50¢
 Sargent & Co., list January 1, 1894.....75¢
 William Wilcox Mfg. Co., list January 1, 1894.....75¢
 Ames Sword Co. up to No. 150.....40¢
 Ames Sword Co. above No. 150.....50¢
 Barnes Mfg. Co.....40¢
 Champion Padlocks.....40¢
 A. E. Deitz.....40¢
 Eagle.....40¢
 Eureka, Eagle Lock Co.....40¢
 E. T. Fram's Keystone Scandinavian.....40¢
 1010 line.....50¢
 109 line.....50¢
 510 line.....70¢
 225, 610 and 209 lines.....70¢
 All other numbers.....50¢
 Horseshoe, # doz \$9.50, 60¢
 Hotchkiss.....30¢
 Nock's.....30¢
 Bomer's Nos. 0 to 91.....30¢
 Bomer's Scandinavian, &c., Nos. 100 to 505.....15¢
 Scandinavian.....90¢
 Scandynavian.....90¢
 Slaymaker, Barry & Co.....90¢
 No. 1010 line.....90¢
 No. 41 line.....50¢
 No. 61 line.....50¢
 No. 21 line.....50¢
 Star.....60¢
 Yale Lock Mfg. Co.'s.....net prices

Sash, &c.—

Attwell Mfg. Co.....25¢
 Champion Safety list January, 1893, 70¢
 Clark's No. 1, 510, No. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

Corbin's Daisy, list Feb. 15, 1888.....70¢
 Davis Bronze, Barnes Mfg. Co.....70¢
 Ferguson's.....70¢
 Fish (Liesche's pat.), No. 100, # gr. \$8.....50¢
 No. 105, # gr. \$19.....50¢
 Giant, list Jan. 1892.....70¢
 Hammond's Window Springs.....40¢
 Huginlin's New Sash Locks.....25¢
 Huginlin's Sash Balances.....25¢
 Ives' Patent.....60¢
 Kempshall's Model.....60¢
 Monarch.....50¢
 Payson's Perfect.....60¢
 Reading.....60¢
 Security.....70¢
 Universal.....60¢
 Victor.....60¢
 Walker's.....10¢
 Wolcott's.....60¢

Lumber Tools—
 See Tools, Lumber.

Lustro—
 Four-ounce bottles.....# doz, \$1.75; # gross.....\$17.00

Machines.

Boring—
 Without Angers, Upright, Angular.
 Boss, Carpenter's.....3.85
 Boss, Ship Bldrs.....3.85
 Douglas.....\$5.50 \$7.75.....50¢
 Jennings.....5.50 6.75.....50¢
 Millers Falls.....7.50.....25¢
 Phillips' Patent.....7.00 7.50.....40¢
 with Anger.....7.00 7.50.....40¢
 Snell's, Rice's Pat 5.50 6.75.....40¢

Fluting—
 American, 5 in., \$3.00; 6 in., \$3.40; 7 in., \$4.50 each.....35¢
 Combined Fluter and Sad Iron.....30¢
 Crown, 4½ in., \$3.50; 6 in., \$4.00; 8 in., \$4.50 each.....35¢
 Crown Hand Fluter, Nos. 1, \$15.00; 2, \$12.50; 3, \$10.00; 4, \$8.25.....30¢
 Crown Jewel, 6 in.....\$3.50 each.....35¢
 Domestic Fluter.....each, \$1.50
 Eagle, 2½ in. Roll, \$2.35.....35¢
 Geneva Hand Fluter, White Metal.....\$2 doz \$12, 25¢
 Knox, 4½ in. Roll.....\$3.25 each.....35¢
 Knox, 6 in. Roll.....\$3.60 each.....35¢
 Shepard Hand Fluter, No. 85, per doz.....\$15.50
 Shepard Hand Fluter, No. 95, # doz.....\$20.00
 Shepard Hand Fluter, No. 110, # doz.....\$11.00

Holisting—
 Moore's Anti-Friction Differential Pulley Block.....20¢
 Moore's Hand Holist, with Lock Brake.....20¢
 Moore's Rope Differential Pulley Block.....20¢
 Morris & Beckley (Teal Patent).....30¢
 See also Blocks.

Washing—
 Fair and Square.....# doz \$42.00
 Anthony Wayne.....# doz, No. 1, \$42; No. 2, \$38; No. 3, \$42.....
 Wayne American.....# doz \$38.00
 Wells.....# doz \$34.00
 Western Star # doz, No. 2, \$36; No. 3 \$39

Mallets—
 B. & L. Block Co., Hickory & L. V. 30¢
 Fibre Head, Stearns.....30¢
 Hickory.....30¢
 Lignumvita.....20¢
 Mattocks—Regular list. 60¢
 Measures—
 Standard Fibreware, No. 1, peck # dozen, \$3.50; ½ peck, \$3.00

Meat Cutters—
 See Cutters, Meat.

Menders, Harness—
 Per doz.....\$2.00

Milk Cans—See Cans, Milk.

Mills—
 Box and Side, list Jan. 1, 1888.....60¢
 Net prices are often made which are lower than above discount.

American, Enterprise Mfg. Co., list Jan. 1, 1889.....20¢
 Swift, Lane Bros.....30¢
 National List, Jan. 1, 1894.....30¢
 Wadell's New Box Mills, Ideal Brand, New List.....60¢

Mincing Knives—
 See Knives, Mincing.

Molasses Gates—
 See Gates, Molasses.

Money Drawers—
 See Drawers, Money.

Mowers, Lawn—
 Out of Season.

Muzzles—
 Safety.....# doz, \$3.00, 25¢

Nails—
 Cut and Wire. See Trade Report.

Wire Nails, Papered.....35¢
 Association list, May 1, 192.....35¢
 Tack Mfrs' list.....70¢
 Hungarian, Finishing, Upholsterers', &c. See Tacks.

Horse—
 Nos. 6 7 8 9 10
 A. C.....25¢ 23¢ 22¢ 21¢ 21¢ 40¢
 American.....9¢ 9¢ 9¢ 9¢ 9¢ net
 Anchor.....23¢ 21¢ 20¢ 19¢ 18¢ 35¢
 Ausable.....23¢ 22¢ 21¢ 20¢ 19¢ 40¢
 Capewell.....19¢ 18¢ 17¢ 16¢ 15¢ 10¢
 C. B. K.....25¢ 23¢ 22¢ 21¢ 21¢ 40¢

Champion.....25¢ 23¢ 22¢ 21¢ 20¢ 10¢
 Champlain.....28¢ 26¢ 25¢ 24¢ 23¢ 10¢
 Clinton, Fin.....19¢ 17¢ 16¢ 15¢ 14¢ 10¢
 Empire Bronzed.....23¢ 22¢ 21¢ 20¢ 19¢ 10¢
 Essex.....23¢ 22¢ 21¢ 20¢ 19¢ 10¢
 Lyra.....9¢ 9¢ 9¢ 9¢ 9¢ net
 Maud S.....25¢ 23¢ 22¢ 21¢ 21¢ 50¢
 Northwest.....25¢ 23¢ 22¢ 21¢ 20¢ 50¢
 Putnam.....23¢ 21¢ 20¢ 19¢ 18¢ 15¢
 Standard.....23¢ 21¢ 20¢ 19¢ 18¢ 35¢
 Vulcan.....23¢ 21¢ 20¢ 19¢ 18¢ 25¢
 Western.....23¢ 21¢ 20¢ 19¢ 18¢ 50¢

Picture—
 Brass Head, Combination list.....50¢
 Brass Head, Sargent's list.....60¢
 Porcelain Head, Combination list.....40¢
 Porcelain Head, Sargent's list.....50¢
 Niles' Patent.....40¢

Nail Pullers—See Pullers, Nail.

Nail Sets—See Sets, Nail.

Nut Crackers—
 See Crackers, Nut.

Nuts—List Dec. 18, 1889.

Square, Hex.
 Cold Punched.....5.00¢ 5.10¢ off list
 Hot Punched.....5.50¢ 5.60¢ off list
 In packages of 100 lb. add 1.10¢
 net; in packages less than 100 lb. add ½¢ lb. net.

Oakum—
 Best or Government.....# lb 6¢
 Navy.....# lb 5¢
 U. S. Navy.....# lb 5¢

Oil Tanks—See Tanks, Oil.

Oilers—
 Brass and Copper.....50¢
 Zinc and Tin.....65¢
 Broughton's.....50¢
 Broughton's Zinc.....50¢
 Malleable, Hammers' Improved, No. 1, \$3.80; No. 2, \$4.00; No. 3, \$4.40 # doz. 10¢
 Malleable, Hammers' Old Pattern, same list.....40¢
 Olmstead's Brass and Copper.....50¢
 Olmstead's Tin and Zinc.....50¢
 Prior's Pat. or "Paragon" Brass.....50¢
 Prior's Pat. or "Paragon" Zinc.....50¢
 Steel, Draper & Williams.....50¢
 Wilmot & Hobbs Mfg. Co., Steel Anti-Rust.....60¢

Openers, Can—
 American.....# gross \$1.75 \$2.00
 Champion.....# doz \$2.00.....50¢
 Domestic.....# doz \$2.00.....45¢
 Duplex.....# doz 25¢ 15¢ 20¢
 Eureka.....# doz \$2.50, 10¢
 Excelsior, No. 1 \$2.50; No. 2, \$1.50.....40¢
 French, No. 1.....# gr \$8.00, 45¢
 Lyman's.....# gr \$3.75, 20¢
 Messenger's Comet.....# doz \$3.00, 25¢
 Moore's.....70¢
 Sardine Scissors.....# doz \$2.75 \$3.00
 Sprague, No. 1, 55¢; 2, 60¢; 3, 65¢
 Star.....# doz \$3.00.....55¢
 Universal.....# gross, No. 1, \$12.00; No. 2, \$24.00; No. 3, \$36.00.....60¢

Packing, Steam—
 Standard, fair quality.....70¢
 Inferior quality.....75¢
 Extra.....60¢
 Jenkins' Standard, # lb 80¢.....25¢
 N. Y. B. & P. Co., Empire.....60¢
 N. Y. B. & P. Co., Salamander.....25¢
 N. Y. B. & P. Co., Standard.....50¢

Miscellaneous—
 American Packing.....10¢
 Cotton Packing.....15¢
 Italian Packing.....15¢
 Russian Packing.....14¢

Pails—
 Creamery—
 S. S. & Co., 18 qt., \$7.00; 20 qt., \$7.25 # doz.

Galvanized—
 Quarts 10 12 14
 Central Stamping Co.....2.50 2.75 3.00
 Fire Buckets.....2.75 3.25 3.50
 Hill's Heavy Weight, # doz. 3.00 3.25 3.75
 Hill's Light Weight, # doz. 2.75 3.00 3.25
 Iron Clad.....2.50 2.75 3.00
 Sidney Shepard & Co.....2.50 2.75 3.00
 Buckets—See Buckets, Well.

Indurated Fiber Ware
 Fire Pails, deep.....# doz \$4.80
 Fire Pails, round bottom.....# doz \$5.40
 Milk, 14 qt.....# doz \$5.40
 Stable, 14 qt.....# doz \$8.00
 Star Pails, 12 qt.....# doz \$4.20

Standard Fiber Ware—
 Plain, Dec'd
 Buggy Pails.....\$3.00
 Chamber Pails, 14 qt.....6.00 \$7.00
 Dairy Pails, 14 qt., # doz. 3.75 4.25
 Fire Pails, No. 1, 12 qt., # doz 3.75
 Fire Pails, No. 2, 14 qt., # doz 4.25
 Horse Pails.....4.00
 Slop Jars (bal. trap).....7.50 8.50
 Sugar Pails.....5.00 5.50
 Water Pails, 12 qt., # doz. 3.15 3.75

Pans—
 Dripping—
 Large sizes.....# 5¢
 Small sizes.....# 6¢
 Silver & Co. (Covered).....40¢

Fry—
 Standard List:
 No.....0 1 2 3 4
 # doz. \$3.00 \$3.75 \$4.25 4.75 \$5.25
 No.....# doz. \$6.00 \$7.00 \$8.00 \$9.00
 Polished, regular goods.....75¢
 Acme Fry Pans.....60¢

Dust—
 Steel Edge, No. 1.....# doz \$1.75

Roasting and Baking—
 Columbian, S. S. & Co., Nos. 10, \$2; 20, \$2.25; 30, \$2.50 each.....60¢

Paper and Cloth—
 Sand and Emery—
 List April 19, 1888.....60¢
 Sibley's Emery and Crocus Cloth.....30¢

Parers—
 Apple—
 Advance.....# doz \$4.75
 Baldwin.....# doz 5.25
 Bonanza.....each 5.00
 Daisy.....# doz 4.00
 Dandy.....each 7.50
 Eclipse.....# doz 4.00
 Eureka, 1888.....each 10.00
 Family Bay State.....# doz 12.00
 Favorite.....# doz 6.00
 Gold Medal.....# doz 4.00
 Ideal.....# doz 4.00
 Improved Bay State.....# doz 27.00 \$30.00
 Little Star.....# doz 4.50
 Monarch.....# doz 13.50
 New Lightning.....# doz 5.50
 Oriole.....# doz 4.00
 Penn.....# doz 3.00
 Perfection.....# doz 4.00
 Pomona.....# doz 4.00
 Reading 72.....# doz 4.25
 Reading 76.....# doz 7.00
 Rocking Table.....# doz 6.00
 Turn Table.....# doz 4.50
 Victor.....# doz 13.50
 Waverly.....# doz 4.00
 White Mountain.....# doz 4.00

Potato—
 Antrim Combination.....# doz \$5.50
 Hoosier.....# doz \$13.50
 Saratoga.....# doz \$5.50
 White Mountain.....# doz \$4.50

Pencils, Soapstone—
 See Crayons.

Pickers, Fruit—
 Prize Fruit Pickers.....50¢

Picks—<

Pullers Nail—

Boltless.....doz., \$24.00, 40¢
 Economy.....doz., \$6.00
 Giant, No. 1.....doz., \$18.00, 10¢
 Giant, No. 2.....doz., \$15.00, 10¢
 Pelican.....doz., \$9.00, 25¢
 Scranton.....doz., \$18.00, 35¢

Pulleys—

Brass Screw.....70¢
 Hay Fork, "Anti-Friction," 5 in. solid.....50¢
 Hay Fork, "F" Common and Patent.....50¢
 Bushed.....20¢
 Hay Fork, Moore's Anti-Friction 5 in.....40¢
 Wheel, do., \$12.00.....40¢
 Hay Fork, Reed's Self-Lubricating.....60¢
 Hay Fork, Solid Eye, \$4.00; Swivel.....\$4.50
 Hay Fork, Stearns' Nos. 35 & 45.....\$08.10¢
 Hay Fork, Stearns' Nos. 15, 25, 56, 66, 600.....20¢
 Hay Fork, Tarbox Pat. Iron.....20¢
 Hot House, Awning, do.....\$08.20¢
 Japanned Clothes Line.....\$08.10¢
 Japanned Screw.....\$08.10¢
 Japanned Steel.....\$08.10¢
 Moore's Ceiling or End, Anti-Friction.....40¢
 Moore's Dumb Waiter, Anti-Friction.....50¢
 Moore's Electric Light.....35¢
 Moore's Side, Anti-Friction.....50¢
 Sash (Auger Mortise).....80¢
 Common Sense.....80¢
 Complete.....80¢
 Acme.....80¢
 Ideal, Nos. 2, 4, 10 & 15.....doz. less 1¢
 Star.....doz. net.
 On bill, lots extra 5¢.
 Shade Rack.....45¢
 Shepard's Niagara, No. 25, doz 23¢ net
 Tackle Blocks—See Blocks.

Pumps—

Cistern, Best Makers.....\$08.00¢
 Pitcher Spout, Best Makers.....\$08.00¢
 Pitcher Spout, Cheaper & do.....\$08.00¢
 Myers' Pumps, low list.....50¢

Punches—

Avery's Revolving.....40¢
 Avery's Saws and Punch—See Saws.....40¢
 Bemis & Call Co.'s Cast Steel Drive.....50¢
 Bemis & Call Co.'s Check.....55¢
 Bemis & Call Co.'s Spring.....50¢
 Bemis & Call Co.'s Springfield Socket.....65¢
 Niagara Hollow Punches.....20¢
 Niagara Solid Punches.....55¢
 Rice Hand Punches.....doz., \$08.00¢
 Saddler's or Drive, good do., \$2.50 & \$2.60
 Spring, good quality.....doz., \$2.50 & \$2.60
 Spring, Leach's Pat.....15¢
 Solid Timmers, P. S. & W. Co., do.....\$1.44
 Timmers' Hollow Punches, P. S. & W. Co.....20¢

Rail—

Barn Door, Light, 1 in. 3/4.....\$2.00
 Per 100 feet.....\$2.00 2.50 3.10, 10¢
 B. D. for N. E. Hangers.....Small, Med. Large.
 Per 100 feet.....\$3.15 2.70 3.25 Net
 Carrier, double braced, Steel Rail.....\$3.40
 foot.....\$3.40
 Lundy Parlor Door, Planed Edge, 7/8 ft.....45¢
 Moody Steel Rail.....25¢
 Moore's Steel Rail.....25¢
 Sliding Door, Bronzed Wrt Iron, 7/8 ft.....75¢
 Sliding Door, Iron, Painted, 7/8 ft.....45¢
 Sliding Door, Iron, Painted, 7/8 ft.....45¢
 Terry's Steel Rail.....\$1.44
 Victor Track Rail, 7/8 ft.....50¢

Rakes—

Cast Steel, Association & do., 70/70 & 52/52
 Cast Steel, outside & do., 70/70 & 52/52
 Malleable.....70/70 & 52/52
 Fort Madison Prize Bow Brace and
 Peerless.....65¢
 Fort Madison Steel Tooth Lawn Rake.....\$5.00
 The Gibbs'.....doz., \$4.90
 Gibbs' Acme Lawn Rake.....doz., \$4.75
 Gibbs' Canton Lawn Rake.....doz., \$4.75
 Gibbs' Crown Lawn Rake, No. 1.....doz., \$4.90
 Gibbs' Favorite Lawn Rake.....doz., \$3.50
 Gibbs' Hustler No. 0.....doz., \$4.25
 Gibbs' Hustler No. 1.....doz., \$4.40
 Oneida Lawn Rake.....doz., \$6.00

Razors—

Campbell Cutlery Co.....50¢
 Electric Cutlery Co.....Net prices
 Galvanic.....doz., \$16.00
 Jordan's AAA1, new list.....Net prices
 Jordan's Old Faithful, new list.....Net prices
 L. R. Torrey Razor.....Net prices
 Wostenholm and Butcher, \$10 to 2.....10¢

Razor Strops—

See *Strops, Razors*

Reels, Clothes Line—

Stearns.....33 1/4 & 10%

Registers—

Moore's Bronze Finishes.....70¢
 Moore's Electroplated.....75¢
 Moore's Japanned.....75¢
 Moore's Solid Bronze.....85¢
 Moore's Stove Pipe.....33 1/4

Rings and Ringers—

Bull Rings—
 Ellrich Hdw. Co., White Metal, low list.....50¢
 Hotchkiss' low list.....30¢
 Humason, Beckley & Co.'s.....70¢
 Peck, Stow & W. Co.'s.....50¢
 Sargent's.....75¢
 Union Nut Co.....65¢
Hog Rings and Ringers—
 Blair's Hog Ringers.....doz \$2.00
 Blair's Hog Ringers.....doz 90¢ & \$1.00
 Brown's Ringers.....doz \$2.00
 Brown's Ringers.....doz \$1.15 & \$1.25
 Champion Ringers.....doz \$2.00
 Champion Ringers, Double.....doz \$2.00
 Electric Hog Ringers.....doz \$2.00
 Electric Hog Ringers.....doz boxes \$1.50
 Hill's Improved Ringers.....doz \$1.25
 Hill's Old Style Ringers.....doz \$1.12 1/2
 Hill's Ringers.....doz bxs \$1.00
 Hill's Tongs.....doz \$3.00
 Major Ringers.....doz \$1.25
 Major Ringers.....doz \$1.25
 Perfect Ringers.....doz \$2.15 & \$2.25
 Perfect Ringers.....doz bxs \$1.50
 Top of the Hill Ringers.....doz \$2.00
 Top of the Hill Ringers.....doz \$1.25
Rivets and Burrs—
 Copper.....60¢
 Coppered Iron, Betina Brand.....50¢
 Iron Norway, list Nov. 17, '87.....60¢
 Second quality.....70¢

Rivet Sets—See Sets.**Roasting and Baking Pans—See Pans, Roasting and Baking.****Rods—**

Stair, Black Walnut.....doz 40¢
 Stair, Brass.....25¢

Rollers—

Acme Moore's Anti-Friction.....55¢
 Barn Door, Sargent's list.....60¢
 Moore's Barn Door Stay.....50¢
 Union Barn Door Roller.....70¢
 Thompson Mfr. Co.'s Lawn Rollers.....30¢

Rope—The following prices are f. o. b. New York or factory, and are shaded 1/4¢ on large lots; terms, 1 1/2% for cash.
 Manila, 7-16 in. diam. and larger.....7 @ 7 1/4¢
 Manila, 1/4 and 5-16 in.....8 @ 7 1/4¢
 Manila, Tarred Rope.....8 @ 6 1/4¢
 Manila, Hay Rope, Med'm.....7 @ 7 1/4¢
 Sisal, 7-16 in. and larger.....5 @ 5 1/4¢
 Sisal, 1/4 and 5-16 in.....6 @ 6 1/4¢
 Sisal, Hay Rope.....5 @ 5 1/4¢
 Sisal, Tarred Rope.....5 @ 5 1/4¢
 Sisal, Medium Lath Yarn.....5 @ 5 1/4¢
 New Zealand.....5 @ 5 1/4¢
 Larger.....5 @ 5 1/4¢
 New Zealand, 3/8 inch.....6 @ 6 1/4¢
 New Zealand, 1/2 and 5-16 in.....6 @ 6 1/4¢
 New Zealand, Hay Rope.....5 @ 5 1/4¢
 New Zealand, Tar'd Rope.....5 @ 5 1/4¢
 Cotton Rope.....18 @ 10 1/4¢
 Jute Rope.....18 @ 10 1/4¢

List February, 1892. All kinds.....45¢

Rules—

Boxwood.....\$08.10¢
 Ivory.....\$08.10¢
 Starrett's Steel Rules and Straight
 Edges.....25¢

Sad Irons—See Irons, Sad.**Sand and Emery Paper and Cloth—**

See *Paper and Cloth*.

Sash Cord—See Cord, Sash.**Sash Locks—See Locks, Sash.****Sash Weights—**

See *Weights, Sash*.

Sausage Stuffers or Fillers—

See *Stuffers or Fillers, Sausage*.

Saws—

Note.—Extra @ 10% often given.

Atkins' Circular.....50¢
 Atkins' Cross Cuts, new list.....40¢
 Atkins' Mulay and Drag.....50¢
 Atkins' One-Man Saw.....40¢
 Atkins' Wood Saws.....40¢
 Diston's Circular.....45¢
 Diston's Cross Cut, list Jan. 1, '93.....40¢
 Diston's Hand.....25¢
 O. B. Jennings & Co.'s.....45¢
 Peace Cross Cuts, list Jan. 1, '93.....45¢
 Peace Hand, Panel and Rip.....25¢
 Richardson's Circular and Mill.....45¢
 Richardson's X Cut, list Jan. 1, '93.....45¢
 Richardson's Hand, &c.....25¢
 Simonds' Circular Saws.....45¢
 Simonds' Crescent Ground Cross Cut
 Saws.....30¢
 Simonds' Gang, Mill, Mulay and Drag
 Saws.....45¢
 Wheeler, Madden & Clemson Mfg. Co.
 Cross Cuts, list Jan. 1, 1893.....45¢
 Hand, Panel and Rip.....30¢
 Woodrough & McFarlin
 Cross Cuts, list Jan. 1, 1893.....45¢
 Hand, Panel and Rip.....25¢

Hack Saws—

Eureka and Crescent.....25¢
 Griffin's complete.....40¢
 Griffin's Hack Saw Blades.....40¢
 Star Hack Saws and Blades.....25¢

Scroll—

Barnes' Builders' and Cab Makers' \$15.25¢
 Barnes' Scroll Saw Blades.....25¢
 Lester, complete, \$10.00.....25¢
 Rogers, complete, \$4.00.....25¢

Saw Frames—

See *Frames, Saw*.

Saw Sets—See Sets, Saw.**Saw Tools—See Tools, Saw.****Scales—**

Chatillon's Eureka.....25¢
 Chatillon's Favorite.....40¢
 Chatillon's Grocers' Trip Scales.....50¢
 Family, Turnbills.....30¢
 Hatch, Counter, No. 171, good quality.....\$18.00
 Hatch, Counter, No. 171, good quality.....\$18.00
 Hatch, Tea, No. 161.....doz \$6.50 & \$7.00
 Riehle Bros' Platform.....40¢
 Union Platform, Plain.....\$2.10 & \$2.50
 Union Platform, Striped.....\$2.40 & \$2.50

Scale Beams—

See *Beams, Scale*.

Scissors, Fluting.....45¢**Scrapers—**

Adjustable Box Scraper (S. R. & L. Co.)
 \$6.00.....40¢
 Box, 1 Handle.....doz \$2.00
 Box, 2 Handle.....doz \$3.00 & \$4.00
 DeLancey Box and Ship.....20¢
 Foot.....50¢
 Ship, Common.....doz \$9.50
 Ship, R. I. Tool Co.....10¢

Screen Window and Door

Frames—See *Frames*

Screw Drivers—

See *Drivers, Screws*

Screws—**Bench and Hand—**

Bench, Iron.....55¢
 Bench, Wood, Beech.....doz \$2.25
 Bench, Wood, Hickory.....20¢
 Hand, Wood.....25¢
 Hand, Grand Rapids, list.....35¢

Coach, Lag and Hand-Rail—

Lag, Blunt Point, list Jan. 1, 1890.....80¢
 Coach and Lag, Blunt Point, list Jan. 1, 1890.....80¢
 Hand Rail, Am. Screw Co.....75¢
 Hand Rail, H. & B. Mfg. Co., 70/10 & 75¢
 Hand Rail, Sargent's.....70¢

Jack Screws—

Jack Screws, Millers Falls list.....50¢
 Jack Screws, P. S. & W.....35¢
 Jack Screws, Sargent.....70¢
 Jack Screws, Stearns.....40¢

Cork—

Detroit Cork Screw Co.....35¢
 Humason & Beckley Mfg. Co., 40/10 & 50¢
 William's, Forged Worm, Apple-
 wood Handle, doz., \$5.00; Rose-
 wood, \$5.50.....40¢

Machine—

Flat Head Iron.....85¢
 Round Head Iron.....80¢

Wood—

List January 1, 1891.
 Flat Head Iron.....70¢
 Round Head Iron.....65¢
 Flat Head Brass.....70¢
 Round Head Brass.....65¢
 Flat Head Bronze.....70¢
 Round Head Bronze.....65¢
 Rogers' Drive Screws.....30¢

Scroll Saws—See Saws, Scroll.**Scythes—**

Grain.....40¢
 Grass.....40¢

Scythe Snaths—

See *Snaths, Scythe*.

Sets—

Awl and Tool—
 Alken's Sets, Awls and Tools,
 No. 20, doz \$10.00.....60¢
 Common Brad Sets,
 No. 42, \$10.50; No. 43, \$12.50.....70¢
 Fray's Adj. Tool Hds., Nos. 1, \$12; 2, \$13;
 3, \$14; 4, \$15.....45¢
 Henry's Combination Hdw. doz \$8.50
 Millers Falls Adj. Tool Hds., No. 1, \$12;
 No. 4, \$12; No. 5, \$18.....25¢
 Stanley's Excelsior
 No. 1, \$7.50; No. 2, \$4.00; No. 3,
 \$5.50.....30¢

Nail—

Round.....gr. \$3.25
 Square.....gr. \$4.00
 Cannon's Diamond Point.....gr. \$12, 20¢

Rivet—

Regular list.....70¢

Saw—

Atkin's Criterion.....doz No. 1, \$3.00
 Atkin's Criterion.....doz No. 2, \$3.00
 Atkin's Criterion.....doz No. 3, \$3.00
 Atkin's Criterion.....doz No. 4, \$3.00
 Atkin's Criterion.....doz No. 5, \$3.00
 Atkin's Criterion.....doz No. 6, \$3.00
 Atkin's Criterion.....doz No. 7, \$3.00
 Atkin's Criterion.....doz No. 8, \$3.00
 Atkin's Criterion.....doz No. 9, \$3.00
 Atkin's Criterion.....doz No. 10, \$3.00
 Atkin's Criterion.....doz No. 11, \$3.00
 Atkin's Criterion.....doz No. 12, \$3.00
 Atkin's Criterion.....doz No. 13, \$3.00
 Atkin's Criterion.....doz No. 14, \$3.00
 Atkin's Criterion.....doz No. 15, \$3.00
 Atkin's Criterion.....doz No. 16, \$3.00
 Atkin's Criterion.....doz No. 17, \$3.00
 Atkin's Criterion.....doz No. 18, \$3.00
 Atkin's Criterion.....doz No. 19, \$3.00
 Atkin's Criterion.....doz No. 20, \$3.00
 Atkin's Criterion.....doz No. 21, \$3.00
 Atkin's Criterion.....doz No. 22, \$3.00
 Atkin's Criterion.....doz No. 23, \$3.00
 Atkin's Criterion.....doz No. 24, \$3.00
 Atkin's Criterion.....doz No. 25, \$3.00
 Atkin's Criterion.....doz No. 26, \$3.00
 Atkin's Criterion.....doz No. 27, \$3.00
 Atkin's Criterion.....doz No. 28, \$3.00
 Atkin's Criterion.....doz No. 29, \$3.00
 Atkin's Criterion.....doz No. 30, \$3.00
 Atkin's Criterion.....doz No. 31, \$3.00
 Atkin's Criterion.....doz No. 32, \$3.00
 Atkin's Criterion.....doz No. 33, \$3.00
 Atkin's Criterion.....doz No. 34, \$3.00
 Atkin's Criterion.....doz No. 35, \$3.00
 Atkin's Criterion.....doz No. 36, \$3.00
 Atkin's Criterion.....doz No. 37, \$3.00
 Atkin's Criterion.....doz No. 38, \$3.00
 Atkin's Criterion.....doz No. 39, \$3.00
 Atkin's Criterion.....doz No. 40, \$3.00
 Atkin's Criterion.....doz No. 41, \$3.00
 Atkin's Criterion.....doz No. 42, \$3.00
 Atkin's Criterion.....doz No. 43, \$3.00
 Atkin's Criterion.....doz No. 44, \$3.00
 Atkin's Criterion.....doz No. 45, \$3.00
 Atkin's Criterion.....doz No. 46, \$3.00
 Atkin's Criterion.....doz No. 47, \$3.00
 Atkin's Criterion.....doz No. 48, \$3.00
 Atkin's Criterion.....doz No. 49, \$3.00
 Atkin's Criterion.....doz No. 50, \$3.00
 Atkin's Criterion.....doz No. 51, \$3.00
 Atkin's Criterion.....doz No. 52, \$3.00
 Atkin's Criterion.....doz No. 53, \$3.00
 Atkin's Criterion.....doz No. 54, \$3.00
 Atkin's Criterion.....doz No. 55, \$3.00
 Atkin's Criterion.....doz No. 56, \$3.00
 Atkin's Criterion.....doz No. 57, \$3.00
 Atkin's Criterion.....doz No. 58, \$3.00
 Atkin's Criterion.....doz No. 59, \$3.00
 Atkin's Criterion.....doz No. 60, \$3.00
 Atkin's Criterion.....doz No. 61, \$3.00
 Atkin's Criterion.....doz No. 62, \$3.00
 Atkin's Criterion.....doz No. 63, \$3.00
 Atkin's Criterion.....doz No. 64, \$3.00
 Atkin's Criterion.....doz No. 65, \$3.00
 Atkin's Criterion.....doz No. 66, \$3.00
 Atkin's Criterion.....doz No. 67, \$3.00
 Atkin's Criterion.....doz No. 68, \$3.00
 Atkin's Criterion.....doz No. 69, \$3.00
 Atkin's Criterion.....doz No. 70, \$3.00
 Atkin's Criterion.....doz No. 71, \$3.00
 Atkin's Criterion.....doz No. 72, \$3.00
 Atkin's Criterion.....doz No. 73, \$3.00
 Atkin's Criterion.....doz No. 74, \$3.00
 Atkin's Criterion.....doz No. 75, \$3.00
 Atkin's Criterion.....doz No. 76, \$3.00
 Atkin's Criterion.....doz No. 77, \$3.00
 Atkin's Criterion.....doz No. 78, \$3.00
 Atkin's Criterion.....doz No. 79, \$3.00
 Atkin's Criterion.....doz No. 80, \$3.00
 Atkin's Criterion.....doz No. 81, \$3.00
 Atkin's Criterion.....doz No. 82, \$3.00
 Atkin's Criterion.....doz No. 83, \$3.00
 Atkin's Criterion.....doz No. 84, \$3.00
 Atkin's Criterion.....doz No. 85, \$3.00
 Atkin's Criterion.....doz No. 86, \$3.00
 Atkin's Criterion.....doz No. 87, \$3.00
 Atkin's Criterion.....doz No. 88, \$3.00
 Atkin's Criterion.....doz No. 89, \$3.00
 Atkin's Criterion.....doz No. 90, \$3.00
 Atkin's Criterion.....doz No. 91, \$3.00
 Atkin's Criterion.....doz No. 92, \$3.00
 Atkin's Criterion.....doz No. 93, \$3.00
 Atkin's Criterion.....doz No. 94, \$3.00
 Atkin's Criterion.....doz No. 95, \$3.00
 Atkin's Criterion.....doz No. 96, \$3.00
 Atkin's Criterion.....doz No. 97, \$3.00
 Atkin's Criterion.....doz No. 98, \$3.00
 Atkin's Criterion.....doz No. 99, \$3.00
 Atkin's Criterion.....doz No. 100, \$3.00

Shavers, Spoke—

Wood.....45¢
 Bailey's (Stanley R. & L. Co.).....50¢
 Cincinnati.....25¢
 Goodell's doz \$9.00.....25¢
 Stearns.....40¢

Shears—

Acme Cast Shears.....10¢
 American (Cast) Iron.....75¢
 Barnes' Cast Trimmers.....doz \$3.75
 Cast Steel Trimmers.....doz \$3.75
 First quality.....80¢
 Second quality.....80¢
 Campbell Cutlery Co., Jap'd.....75¢
 Nickel Plated.....65¢
 Claus brand, Japanned.....70¢
 Claus brand, Nickel, same list.....70¢
 Clippert's.....10¢
 Davenport Cutlery Co.....60¢
 Diamond Cast Shears.....10¢
 Electric Cutlery Co.....Net
 Galvanic 9 1/2 in. doz \$1.00 * 1 inch
 Hatch Cutlery Co., Solid Steel Forged.....60¢
 Heinich's, list Dec. 1891.....60¢
 Heinich's Tailor's Shears.....35¢
 Howe Bros. & Hulbert, Solid Forged
 Steel.....40¢
 Seymour's, list Dec. 1891.....40¢

Victor Cast Shears.....75¢**Timmers' Snips.....40¢**

Cast Handle, Laid with Steel.....40¢
 Niagara Snips and Shears.....20¢
 Wrt. Handles, Steel Blades.....20¢

Pruning Shears and Hook

Diston's Combined Pruning Hook
 and Saw.....doz \$18.00, 10¢
 Diston's Pruning Hook, do.....doz \$12.00, 10¢
 Dunlap's Saw and Chisel, doz \$8.50, 50¢
 Henry's Pruning Shears, doz \$3.25
 E. S. Lee & Co.'s Pruning Tools.....50¢
 Levin Pruner No. 1, \$15.00 doz 40¢
 Levin Pruner No. 2, \$21.00 doz 40¢
 J. Mallinson & Co., No. 1, \$5.25; No. 2, \$7.25
 Pruning Shears, Henry's Pat., doz.....\$3.50 & \$4.00
 P. S. & W. Co.....60¢
 Wheeler, M. & C. Co., Combination.....doz \$12.00

Timmers', &c.—

Shears and Snips (P. S. & W.).....20¢
 Snips, J. Mallinson & Co.....35¢

Sheaves—**Sliding Door—**

Corbin's list.....60¢
 M. W. Co., list July 1888.....50¢
 Moore's Anti-Friction.....50¢
 Patent Roller.....60¢
 Patent Roller, Hatfield's.....50¢
 R. & E., list Dec. 18, 1885.....55¢
 Russell's Anti-Friction, list Dec. 18,
 1885.....60¢

Sliding Shutter—

Reading list.....60¢
 R. & E., list Dec. 18, 1885.....60¢
 Sargent's list.....70¢

Shells—

Brass Shot Shells, Club, Rival, Climax
 Brass Shot Shells, 1st quality.....60¢
 First quality 4, 8, 10 and 12 gauge
 25¢
 First quality Rival, Club and Climax
 brands, 14, 16 and 20 gauge (\$7.50
 list).....20¢
 First quality 4, 8, 10 and 12 gauge
 25¢
 Selbold's Comb. Shot Shells.....15¢
 Smokeless brand, 12, 10, 10 gauge.....35¢
 Star, Club, Rival and Climax Brands.....35¢
 Trap brand, 12 and 10 gauge.....35¢
 Standard list, July 19, 1890.....40¢
 40¢ & 10¢ & 10¢ & 10¢ & 10¢
 7% cash, 10 days.

Ship Tools—

L. & I. J. White.....20¢

Shoes, Horse, Mule, &c.**Horse—**

B

Snaps, Harness, &c.—
Anchor 1. & S. Mfg. Co., 50¢
Andrews, 50¢
Covert's Sundry Works' Triumph, 15¢
Covered Snap, 60¢
Covert, 50¢
Covert, New Patent, 50¢
Covert, New R. E., 50¢
Fitch's (British), 40¢
German, new list, 40¢
Hotchkiss, 40¢
Kelley & Woolworth's Steel Harness, 50¢

John Prots Snaps, 75¢
Sargent's Patent Guarded, 70¢

Snaths—
Soythe, 50¢

Soldering Irons—
See Soldering.

Spittoons, Cuspidors, &c.
Standard Fiberglass
Cuspidors, 5-in. inch, 50¢
Spittoons, 5-in. inch, No. 1, 10 and 11 inch, 50¢

Spoke Shaves—
See Spoke Shave.

Spoke Trimmers—
See Trimmers, Spoke.

Spoons and Forks—
Tinned Iron—
Basting, Cen. Stamp, Co.'s list, 70¢
Buffalo, S. & Co., 85¢
Solid Table and Tea, Cen. Stamp, Co.'s list, 70¢

Silver Plated—
4 months or 5¢ cash 30 days—
L. Boardman & Son, 50¢
Holmes & Edwards Silver Co., 40¢
Meriden B. Co., Rogers, 40¢
Reed & Barton, 40¢
Rogers & Bros, 40¢
O. Rogers & Bros, 40¢
Rogers & Hamilton, 40¢
Wm. Rogers Mfg. Co., 40¢
Simpson, E. H., Miller & Co., 40¢

Miscellaneous—
Boardman's Britannia Spoons, case lots, 60¢
Boardman's Nickel Silver, list July 1, 1891, 60¢
Britannia, 60¢
German Silver, 60¢
Nickel Silver, 60¢
Holmes & Edwards Silver Co., 60¢
No. 24 German Silver, 60¢
No. 30 Silver Metal, 60¢
No. 49 Nickel Silver, 60¢
No. 60 Nickel Silver, 60¢
No. 67 Nickel Silver, 60¢
Rogers & Hamilton, 60¢
Climet, Flatware, 40¢
Climet, Steel Goods, 40¢
Crown Hamilton, Flatware and Cutlery, 30¢
Steel Goods, 40¢
Wm. Rogers Mfg. Co., 40¢
18¢ Rogers' German Silver, 40¢
22¢ Rogers' Nickel Silver, 40¢
Rogers' Silver Metal, 60¢

Spings—Door—
Champion Coll., 60¢
Cowell's, No. 1, 10¢
Gem (Coll), list April 19, 1888, 50¢
Hercules, 50¢
Phenix, 50¢
Rubber, complete, 40¢
Star (Coll), list April 19, 1888, 50¢
Torrey's Rod, 39 in., 10¢
Warner's No. 1, 10¢
Victor (Coll), 60¢

Carriage, Wagon, &c.—
Elliptic, Concord, Platform and Half Scroll, 60¢
Chairs, Roller Springs, 25¢

Sprinklers, Lawn—
Gibbs' Arc, 12¢
Gibbs' Hustler, 10¢

Squares—
Nickel-Plated, 80¢
Steel and Iron, 50¢
Try Square and T Bevels, 60¢
Avery's Bevel Protractor, 50¢
Avery's Finish Bevel Square, 40¢
Diston's Try Square and T Bevels, 50¢
Starrett's Micrometer Caliper Squares, 25¢
Winterbottom's Try and Miter, 30¢

Squeezers—
Fodder—
Blair's, 50¢
Blair's "Olimax", 12¢

Lemon—
Porcelain Lined, No. 1, 25¢
Wood, Common, 10¢
Wood, No. 2, 10¢
Dean's, No. 1, 10¢
Dunlap's Improved, 10¢
Hotchkiss Straight Flash, 10¢
Jennings' Star, 10¢
King, 10¢
Little Giant, 10¢
Sammis, No. 1, 10¢
Satter & Co. Glass, 10¢
The Boss, 10¢

Standard Fiber Ware—
See Ware, Standard Fiber.

Staples—
Barbed Binding, 10¢
Barbed Binding, 10¢
Fence Staples, Galvanized, 10¢
Fence Staples, Plain, 10¢
Grand Crossing Tack Co.'s list, 75¢
C. & A. Hoffmann's, 40¢
Nichols Bros., 40¢

Steelyards—
Stocks and Dies—
Blacksmith's, 35¢
Butterfield's Goods, 35¢
Waterford Goods, 35¢
Gardner, 25¢
Green River, 25¢
Lightning Screw Plate, 35¢
Reece's New Screw Plates, 25¢
Reversible Ratchet, 30¢

Stops, Bench—
Cincinnati, 25¢
Crescent, 10¢
Hotchkiss, 10¢
McGills, 10¢
Millers Falls, 10¢

Morrill's, 10¢
Stearns, 10¢
Terrell's Nos. 1 and 2, 10¢

Stone—
Grind-Stone—
Pike Mfg. Co., list April 1892, 35¢
Cleveland Oil Stone, 35¢

Scythe Stones—
Pike Mfg. Co., 35¢

Stones, Grind—See Grindstones.

Stove Polish—
See Polish, Stove.

Stretchers Carpet—
Cast Iron Steel Points, 75¢
Cast Steel, Polished, 75¢
Socket, 75¢
Bullard's, 25¢

Strops Razor—
Badger's Belt and Com., 20¢
Campbell Cutlery Co., net prices
Electric Cutlery Co., net prices
Genuin, Emerson, 40¢
Imitation, 40¢
Jordan's Pat. Padded, list Nov. 1, 1890, 40¢
Lamont Combination, 40¢
Torrey's, net prices

Stuffer Sausage—
Miles' Challenge, 20¢
Perry, 20¢
Draw Cut No. 4, each 30¢
Enterprise Mfg. Co., list Jan 17, '93, 20¢
Silver's, 40¢

Sweepers, Carpet and Lawn—
Acme, 20¢
Advance, 20¢
Banner, 20¢
Jap'd, 20¢
Bissell No. 6, 20¢
Bissell No. 8, 20¢
Bissell, Grand, 20¢
Crown Jewel, No. 1, 18¢
Domestic, 20¢
Housewife's Delight, 20¢
Imperial, 20¢
Improved Parlor Queen, 20¢
Japanned, 20¢
Nickel, 20¢
Ladies' Friend, 20¢
Ladies' Friend No. 2, 20¢
Magic, 20¢
Model, 20¢
Parlor Queen, 20¢
Our Leader, 20¢
Our Own, 20¢
Reliable, 20¢
Standard, 20¢
Supreme, 20¢
The Star, 20¢
Triumph, 20¢
Goshen Sweeper Company, Grand Rapids, Mich., make the following reduced prices in 6 months, 10¢
Exception on L.F., when 10 dozen price is \$13.50, and 25 dozen \$13.00.

Lawn—
Thompson Mfg. Co., 30¢
Davies Lawn, 25¢

Tacks, Brads &c.—
List October 19, 1889. Old established straight Weights. Short Weight goods are sold at lower prices.
Carpet Tacks, 50¢
American, Blued and Cop'd, 50¢
Steel, Bright and Blued, 50¢
Steel, Tinned and Coppered, 50¢
Swedes Iron, S. S., Blued, 50¢
Swedes Iron, S. S., Tinned, 50¢
American Iron Tacks, Foreign, 50¢
Swedes Iron Tacks, 50¢
S. S., Blued, 50¢
S. S., Tinned, 50¢
Lanc, Blued, 50¢
Lanc, Tinned, 50¢
Upholsterers' S. S., 50¢
Group Tacks, 50¢
S. S., Blued, 50¢
S. S., Tinned, 50¢
Lanc, Blued, 50¢
Lanc, Tinned, 50¢
Banc, and Trimmers' Tacks, 50¢
S. S., 50¢
Hungarian Nails, 50¢
Common and Patent Brads, 50¢
Leathered Tacks, 50¢
Brush Tacks and Nails, S. S., 25¢
Looking Glass Tacks, S. S., 15¢
Picture-Frame Points, S. S., 15¢
Lace Tacks, Blued, 50¢
Lace Tacks, Tinned, 50¢
Finishing Nails, 50¢
Trunk and Clout Nails, 50¢
Black, 50¢
Tinned or Coppered, 50¢
Basket Nails, 50¢
Chair Nails, 50¢
Olive Box Nails, 50¢
Tin Capped Nails, 50¢

Miscellaneous—
Double Point, 10¢
Wire Carpet Nails, 10¢
Bill Nye Brad Box, 10¢
Bonnie Blue, 10¢
Blanc Handle Carpet, 10¢
Home Tacks, No. 50, 10¢
Home Tacks, No. 100, 10¢
Home Nails, No. 20, 10¢
Home Nails, No. 40, 10¢
Parlan Gilt Nails, cartoon, 50¢
Plymouth Rock Carpet Tacks, 20¢
Upholsterers' Nails, 10¢
Steel-Wire Brads, R. & E. Mfg. Co.'s list, 50¢

Wire Brads and Nails—
See also Nails, Wire.

Tanks, Oil—
Emerald, S. S. & Co., 30-gal., \$3.75; 60-gal., \$11 each, 50¢

Tapes, Measuring—
American, 40¢
Chesterman's, Regular list, 20¢
Excelsior, Special list, 20¢
Spring, 40¢

Thermometers—
Tin Case, 80¢

Thimble Skeins—See Skeins.

Ties, Bale—Steel.

Tinners' Shears, &c.—
See Shears, Tinners' &c.

Tinware—
Stamped, Japanned and Plead, list Jan 20, 1887, 70¢

Tire Benders, Upsetters, &c.—
See Benders and Upsetters Tire.

Tobacco Cutters—
See Cutters, Tobacco.

Tools—Coopers—
Albertson Mfg. Co., 25¢
Barton's, 20¢
Beatty's, 30¢
Bradley's, 20¢
Sandsbury Tool Co., 30¢
Shaver Cincinnati Tool Co., 20¢
L. & J. White, 20¢

Lumber—
Cant Hooks, "Blue Line", 10¢
Cant Hooks, Common Finish, 10¢
Cant Hooks, Mail Socket Clasp, "Blue Line" Finish, 10¢
Cant Hooks, Mail Socket Clasp, Common Finish, 10¢
Cant Hooks, Clip Clasp, "Blue Line" Finish, 10¢
Cant Hooks, Clip Clasp, Common Finish, 10¢
Hand Spikes, 10¢

Pike Poles, Pike & Hook—
11 ft., 12 ft., 13 ft., 14 ft., 15 ft., 16 ft., 17 ft., 18 ft., 19 ft., 20 ft., 21 ft., 22 ft., 23 ft., 24 ft., 25 ft., 26 ft., 27 ft., 28 ft., 29 ft., 30 ft., 31 ft., 32 ft., 33 ft., 34 ft., 35 ft., 36 ft., 37 ft., 38 ft., 39 ft., 40 ft., 41 ft., 42 ft., 43 ft., 44 ft., 45 ft., 46 ft., 47 ft., 48 ft., 49 ft., 50 ft., 51 ft., 52 ft., 53 ft., 54 ft., 55 ft., 56 ft., 57 ft., 58 ft., 59 ft., 60 ft., 61 ft., 62 ft., 63 ft., 64 ft., 65 ft., 66 ft., 67 ft., 68 ft., 69 ft., 70 ft., 71 ft., 72 ft., 73 ft., 74 ft., 75 ft., 76 ft., 77 ft., 78 ft., 79 ft., 80 ft., 81 ft., 82 ft., 83 ft., 84 ft., 85 ft., 86 ft., 87 ft., 88 ft., 89 ft., 90 ft., 91 ft., 92 ft., 93 ft., 94 ft., 95 ft., 96 ft., 97 ft., 98 ft., 99 ft., 100 ft., 101 ft., 102 ft., 103 ft., 104 ft., 105 ft., 106 ft., 107 ft., 108 ft., 109 ft., 110 ft., 111 ft., 112 ft., 113 ft., 114 ft., 115 ft., 116 ft., 117 ft., 118 ft., 119 ft., 120 ft., 121 ft., 122 ft., 123 ft., 124 ft., 125 ft., 126 ft., 127 ft., 128 ft., 129 ft., 130 ft., 131 ft., 132 ft., 133 ft., 134 ft., 135 ft., 136 ft., 137 ft., 138 ft., 139 ft., 140 ft., 141 ft., 142 ft., 143 ft., 144 ft., 145 ft., 146 ft., 147 ft., 148 ft., 149 ft., 150 ft., 151 ft., 152 ft., 153 ft., 154 ft., 155 ft., 156 ft., 157 ft., 158 ft., 159 ft., 160 ft., 161 ft., 162 ft., 163 ft., 164 ft., 165 ft., 166 ft., 167 ft., 168 ft., 169 ft., 170 ft., 171 ft., 172 ft., 173 ft., 174 ft., 175 ft., 176 ft., 177 ft., 178 ft., 179 ft., 180 ft., 181 ft., 182 ft., 183 ft., 184 ft., 185 ft., 186 ft., 187 ft., 188 ft., 189 ft., 190 ft., 191 ft., 192 ft., 193 ft., 194 ft., 195 ft., 196 ft., 197 ft., 198 ft., 199 ft., 200 ft., 201 ft., 202 ft., 203 ft., 204 ft., 205 ft., 206 ft., 207 ft., 208 ft., 209 ft., 210 ft., 211 ft., 212 ft., 213 ft., 214 ft., 215 ft., 216 ft., 217 ft., 218 ft., 219 ft., 220 ft., 221 ft., 222 ft., 223 ft., 224 ft., 225 ft., 226 ft., 227 ft., 228 ft., 229 ft., 230 ft., 231 ft., 232 ft., 233 ft., 234 ft., 235 ft., 236 ft., 237 ft., 238 ft., 239 ft., 240 ft., 241 ft., 242 ft., 243 ft., 244 ft., 245 ft., 246 ft., 247 ft., 248 ft., 249 ft., 250 ft., 251 ft., 252 ft., 253 ft., 254 ft., 255 ft., 256 ft., 257 ft., 258 ft., 259 ft., 260 ft., 261 ft., 262 ft., 263 ft., 264 ft., 265 ft., 266 ft., 267 ft., 268 ft., 269 ft., 270 ft., 271 ft., 272 ft., 273 ft., 274 ft., 275 ft., 276 ft., 277 ft., 278 ft., 279 ft., 280 ft., 281 ft., 282 ft., 283 ft., 284 ft., 285 ft., 286 ft., 287 ft., 288 ft., 289 ft., 290 ft., 291 ft., 292 ft., 293 ft., 294 ft., 295 ft., 296 ft., 297 ft., 298 ft., 299 ft., 300 ft., 301 ft., 302 ft., 303 ft., 304 ft., 305 ft., 306 ft., 307 ft., 308 ft., 309 ft., 310 ft., 311 ft., 312 ft., 313 ft., 314 ft., 315 ft., 316 ft., 317 ft., 318 ft., 319 ft., 320 ft., 321 ft., 322 ft., 323 ft., 324 ft., 325 ft., 326 ft., 327 ft., 328 ft., 329 ft., 330 ft., 331 ft., 332 ft., 333 ft., 334 ft., 335 ft., 336 ft., 337 ft., 338 ft., 339 ft., 340 ft., 341 ft., 342 ft., 343 ft., 344 ft., 345 ft., 346 ft., 347 ft., 348 ft., 349 ft., 350 ft., 351 ft., 352 ft., 353 ft., 354 ft., 355 ft., 356 ft., 357 ft., 358 ft., 359 ft., 360 ft., 361 ft., 362 ft., 363 ft., 364 ft., 365 ft., 366 ft., 367 ft., 368 ft., 369 ft., 370 ft., 371 ft., 372 ft., 373 ft., 374 ft., 375 ft., 376 ft., 377 ft., 378 ft., 379 ft., 380 ft., 381 ft., 382 ft., 383 ft., 384 ft., 385 ft., 386 ft., 387 ft., 388 ft., 389 ft., 390 ft., 391 ft., 392 ft., 393 ft., 394 ft., 395 ft., 396 ft., 397 ft., 398 ft., 399 ft., 400 ft., 401 ft., 402 ft., 403 ft., 404 ft., 405 ft., 406 ft., 407 ft., 408 ft., 409 ft., 410 ft., 411 ft., 412 ft., 413 ft., 414 ft., 415 ft., 416 ft., 417 ft., 418 ft., 419 ft., 420 ft., 421 ft., 422 ft., 423 ft., 424 ft., 425 ft., 426 ft., 427 ft., 428 ft., 429 ft., 430 ft., 431 ft., 432 ft., 433 ft., 434 ft., 435 ft., 436 ft., 437 ft., 438 ft., 439 ft., 440 ft., 441 ft., 442 ft., 443 ft., 444 ft., 445 ft., 446 ft., 447 ft., 448 ft., 449 ft., 450 ft., 451 ft., 452 ft., 453 ft., 454 ft., 455 ft., 456 ft., 457 ft., 458 ft., 459 ft., 460 ft., 461 ft., 462 ft., 463 ft., 464 ft., 465 ft., 466 ft., 467 ft., 468 ft., 469 ft., 470 ft., 471 ft., 472 ft., 473 ft., 474 ft., 475 ft., 476 ft., 477 ft., 478 ft., 479 ft., 480 ft., 481 ft., 482 ft., 483 ft., 484 ft., 485 ft., 486 ft., 487 ft., 488 ft., 489 ft., 490 ft., 491 ft., 492 ft., 493 ft., 494 ft., 495 ft., 496 ft., 497 ft., 498 ft., 499 ft., 500 ft., 501 ft., 502 ft., 503 ft., 504 ft., 505 ft., 506 ft., 507 ft., 508 ft., 509 ft., 510 ft., 511 ft., 512 ft., 513 ft., 514 ft., 515 ft., 516 ft., 517 ft., 518 ft., 519 ft., 520 ft., 521 ft., 522 ft., 523 ft., 524 ft., 525 ft., 526 ft., 527 ft., 528 ft., 529 ft., 530 ft., 531 ft., 532 ft., 533 ft., 534 ft., 535 ft., 536 ft., 537 ft., 538 ft., 539 ft., 540 ft., 541 ft., 542 ft., 543 ft., 544 ft., 545 ft., 546 ft., 547 ft., 548 ft., 549 ft., 550 ft., 551 ft., 552 ft., 553 ft., 554 ft., 555 ft., 556 ft., 557 ft., 558 ft., 559 ft., 560 ft., 561 ft., 562 ft., 563 ft., 564 ft., 565 ft., 566 ft., 567 ft., 568 ft., 569 ft., 570 ft., 571 ft., 572 ft., 573 ft., 574 ft., 575 ft., 576 ft., 577 ft., 578 ft., 579 ft., 580 ft., 581 ft., 582 ft., 583 ft., 584 ft., 585 ft., 586 ft., 587 ft., 588 ft., 589 ft., 590 ft., 591 ft., 592 ft., 593 ft., 594 ft., 595 ft., 596 ft., 597 ft., 598 ft., 599 ft., 600 ft., 601 ft., 602 ft., 603 ft., 604 ft., 605 ft., 606 ft., 607 ft., 608 ft., 609 ft., 610 ft., 611 ft., 612 ft., 613 ft., 614 ft., 615 ft., 616 ft., 617 ft., 618 ft., 619 ft., 620 ft., 621 ft., 622 ft., 623 ft., 624 ft., 625 ft., 626 ft., 627 ft., 628 ft., 629 ft., 630 ft., 631 ft., 632 ft., 633 ft., 634 ft., 635 ft., 636 ft., 637 ft., 638 ft., 639 ft., 640 ft., 641 ft., 642 ft., 643 ft., 644 ft., 645 ft., 646 ft., 647 ft., 648 ft., 649 ft., 650 ft., 651 ft., 652 ft., 653 ft., 654 ft., 655 ft., 656 ft., 657 ft., 658 ft., 659 ft., 660 ft., 661 ft., 662 ft., 663 ft., 664 ft., 665 ft., 666 ft., 667 ft., 668 ft., 669 ft., 670 ft., 671 ft., 672 ft., 673 ft., 674 ft., 675 ft., 676 ft., 677 ft., 678 ft., 679 ft., 680 ft., 681 ft., 682 ft., 683 ft., 684 ft., 685 ft., 686 ft., 687 ft., 688 ft., 689 ft., 690 ft., 691 ft., 692 ft., 693 ft., 694 ft., 695 ft., 696 ft., 697 ft., 698 ft., 699 ft., 700 ft., 701 ft., 702 ft., 703 ft., 704 ft., 705 ft., 706 ft., 707 ft., 708 ft., 709 ft., 710 ft., 711 ft., 712 ft., 713 ft., 714 ft., 715 ft., 716 ft., 717 ft., 718 ft., 719 ft., 720 ft., 721 ft., 722 ft., 723 ft., 724 ft., 725 ft., 726 ft., 727 ft., 728 ft., 729 ft., 730 ft., 731 ft., 732 ft., 733 ft., 734 ft., 735 ft., 736 ft., 737 ft., 738 ft., 739 ft., 740 ft., 741 ft., 742 ft., 743 ft., 744 ft., 745 ft., 746 ft., 747 ft., 748 ft., 749 ft., 750 ft., 751 ft., 752 ft., 753 ft., 754 ft., 755 ft., 756 ft., 757 ft., 758 ft., 759 ft., 760 ft., 761 ft., 762 ft., 763 ft., 764 ft., 765 ft., 766 ft., 767 ft., 768 ft., 769 ft., 770 ft., 771 ft., 772 ft., 773 ft., 774 ft., 775 ft., 776 ft., 777 ft., 778 ft., 779 ft., 780 ft., 781 ft., 782 ft., 783 ft., 784 ft., 785 ft., 786 ft., 787 ft., 788 ft., 789 ft., 790 ft., 791 ft., 792 ft., 793 ft., 794 ft., 795 ft., 796 ft., 797 ft., 798 ft., 799 ft., 800 ft., 801 ft., 802 ft., 803 ft., 804 ft., 805 ft., 806 ft., 807 ft., 808 ft., 809 ft., 810 ft., 811 ft., 812 ft., 813 ft., 814 ft., 815 ft., 816 ft., 817 ft., 818 ft., 819 ft., 820 ft., 821 ft., 822 ft., 823 ft., 824 ft., 825 ft., 826 ft., 827 ft., 828 ft., 829 ft., 830 ft., 831 ft., 832 ft., 833 ft., 834 ft., 835 ft., 836 ft., 837 ft., 838 ft., 839 ft., 840 ft., 841 ft., 842 ft., 843 ft., 844 ft., 845 ft., 846 ft., 847 ft., 848 ft., 849 ft., 850 ft., 851 ft., 852 ft., 853 ft., 854 ft., 855 ft., 856 ft., 857 ft., 858 ft., 859 ft., 860 ft., 861 ft., 862 ft., 863 ft., 864 ft., 865 ft., 866 ft., 867 ft., 868 ft., 869 ft., 870 ft., 871 ft., 872 ft., 873 ft., 874 ft., 875 ft., 876 ft., 877 ft., 878 ft., 879 ft., 880 ft., 881 ft., 882 ft., 883 ft., 884 ft., 885 ft., 886 ft., 887 ft., 888 ft., 889 ft., 890 ft., 891 ft., 892 ft., 893 ft., 894 ft., 895 ft., 896 ft., 897 ft., 898 ft., 899 ft., 900 ft., 901 ft., 902 ft., 903 ft., 904 ft., 905 ft., 906 ft., 907 ft., 908 ft., 909 ft., 910 ft., 911 ft., 912 ft., 913 ft., 914 ft., 915 ft., 916 ft., 917 ft., 918 ft., 919 ft., 920 ft., 921 ft., 922 ft., 923 ft., 924 ft., 925 ft., 926 ft., 927 ft., 928 ft., 929 ft., 930 ft., 931 ft., 932 ft., 933 ft., 934 ft., 935 ft., 936 ft., 937 ft., 938 ft., 939 ft., 940 ft., 941 ft., 942 ft., 943 ft., 944 ft., 945 ft., 946 ft., 947 ft., 948 ft., 949 ft., 950 ft., 951 ft., 952 ft., 953 ft., 954 ft., 955 ft., 956 ft., 957 ft., 958 ft., 959 ft., 960 ft., 961 ft., 962 ft., 963 ft., 964 ft., 965 ft., 966 ft., 967 ft., 968 ft., 969 ft., 970 ft., 971 ft., 972 ft., 973 ft., 974 ft., 975 ft., 976 ft., 977 ft., 978 ft., 979 ft., 980 ft., 981 ft., 982 ft., 983 ft., 984 ft., 985 ft., 986 ft., 987 ft., 988 ft., 989 ft., 990 ft., 991 ft., 992 ft., 993 ft., 994 ft., 995 ft., 996 ft., 997 ft., 998 ft., 999 ft., 1000 ft., 1001 ft., 1002 ft., 1003 ft., 1004 ft., 1005 ft., 1006 ft., 1007 ft., 1008 ft., 1009 ft., 1010 ft., 1011 ft., 1012 ft., 1013 ft., 1014 ft., 1015 ft., 1016 ft., 1017 ft., 1018 ft., 1019 ft., 1020 ft., 1021 ft., 1022 ft., 1023 ft., 1024 ft., 1025 ft., 1026 ft., 1027 ft., 1028 ft., 1029 ft., 1030 ft., 1031 ft., 1032 ft., 1033 ft., 1034 ft., 1035 ft., 1036 ft., 1037 ft., 1038 ft., 1039 ft., 1040 ft., 1041 ft., 1042 ft., 1043 ft., 1044 ft., 1045 ft., 1046 ft., 1047 ft., 1048 ft., 1049 ft., 1050 ft., 1051 ft., 1052 ft., 1053 ft., 1054 ft., 1055 ft., 1056 ft., 1057 ft., 1058 ft., 1059 ft., 1060 ft., 1061 ft., 1062 ft., 1063 ft., 1064 ft., 1065 ft., 1066 ft., 1067 ft., 1068 ft., 1069 ft., 1070 ft., 1071 ft., 1072 ft., 1073 ft., 1074 ft., 1075 ft., 1076 ft., 1077 ft., 1078 ft., 1079 ft., 1080 ft., 1081 ft., 1082 ft., 1083 ft., 1084 ft., 1085 ft., 1086 ft., 1087 ft., 1088 ft., 1089 ft., 1090 ft., 1091 ft., 1092 ft., 1093 ft., 1094 ft., 1095 ft., 1096 ft., 1097 ft., 1098 ft., 1099 ft., 1100 ft., 1101 ft., 1102 ft., 1103 ft., 1104 ft., 1105 ft., 1106 ft., 1107 ft., 1108 ft., 1109 ft., 1110 ft., 1111 ft., 1112 ft., 1113 ft., 1114 ft., 1115 ft., 1116 ft., 1117 ft., 1118 ft., 1119 ft., 1120 ft., 1121 ft., 1122 ft., 1123 ft., 1124 ft., 1125 ft., 1126 ft., 1127 ft., 1128 ft., 1129 ft., 1130 ft., 1131 ft., 1132 ft., 1133 ft., 1134 ft., 1135 ft., 1136 ft., 1137 ft., 1138 ft., 1139 ft., 1140 ft., 1141 ft., 1142 ft

Whips

American Whip Co.: Length.	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8 ft.
X. L. Whalebone Driving.....	\$18.00	20.00	22.00	24.00	27.00	30.00	33.00	36.00
Eureka, Two-thirds Whalebone.....	15.00	16.50	18.00	20.00				
Bull Bone, Half-length Whalebone.....			11.00	12.00	13.00	15.00		
American Standard.....	8.00	8.50	9.50	10.50	12.00	13.50	15.00	16.50
True Grip, Raw Hide Center.....	6.00	6.00	6.50	7.00	7.50	9.00		
New Name, Stocked Java, Black and White Colors.....				6.00				
Americus, 93 Pat. Whip.....				6.00				
Gents' Light Driving No. 111.....				6.00				
Gents' Light Driving No. 106.....				5.00				
Hand-made Stocked Java No. 103.....			3.75	4.00				
A large variety of cheaper grades.....								
Team Whips.....								
Toy Whips.....								
Hardware Assortment, 10/American, 75 Whips for \$50.00.								

Wire and Wire Goods—**Iron—**

Market,	Br. & Ann., Nos. 0 to 18.	Extra 5@10%
	75@100/75@100	often given
	Galv., Nos. 0 to 18.	and low net prices often
	70@75/70@100	made on
	Tin'd, Tin'd, Nos. 0 to 18.	large lots,
	70@70/100	

Stone, Br. and Ann'd,	Nos. 19 to 18.	Extra 10%
	80@85	often given.
	Nos. 27 to 36.	82@85
	Ann. Wire on Spools.....	60%
	Brass, list Jan. 18, 1884.....	40@55
	Cast Steel Wire.....	50%
	Copper, list Jan. 18, 1884.....	40@55
	Galvanized Fence.....	75@100
	Main's An'led & Tin'd on Spools.....	60@85
	Main's Brass and Cop. on Spools.....	50@85

Steel Music Wire, 12 to 80, imported..... 60@70
 Stubs' Steel Wire..... \$6.00 to 2.80
 Tate's Spooled, Tin'd & Annealed..... 60@85
 Tate's Spooled Cop. and Brass..... 50%
 Tinned Broom Wire, 18 to 21, # B..... 40%
 Wire Clothes Line, see Line.
 Wire Picture Cord, see Cord.

Bright Wire Goods—

Standard list..... 35@100/100@90%

Wire Cloth and Netting—

Galvanized Wire Netting..... 80@80/100

Painted Screen Cloth # 100 ft \$1.40 @ \$1.45

Wire Barb—

See Trade Report.

Wire Rope—See Rope, Wire.**Wrenches—**

American Adjustable	40%
Baxter's Adjustable "S".....	40@100/50%
Baxter's Diagonal.....	60%
Coe's Genuine.....	50@50/100%
Coe's "Mechanics".....	50@100/3%
Girard Standard.....	65@100/70%
Lamson & Sessions' Engineers'.....	60@100
Lamson & Sessions' Standard.....	70@100
Girard Agricultural.....	
Lamson & Sessions' Agric'l.....	75@100/80%
P. S. & W. Agricultural.....	
W. & B. Diamond.....	

Acme, Bright.....	50@85
Acme, Nickle.....	40@85
Alken's Pocket (Bright).....	\$5.00, 50@100
Alligator.....	80%
Always Ready.....	25@85
Bemis & Call's.....	
Briggs' Pattern.....	30@100
Cylinder or Gas Pipe.....	45@85
Merrick's Pattern.....	45%
No. 3 Pipe.....	55%
Pat. Combination Black.....	40@100
Pat. Combination Bright.....	40@85
Boardman's.....	30%
Cincinnati Brace Wrenches.....	25@100
Diamond Steel.....	55@85
Donohue's Engineer.....	20@100
Eagle.....	50@100
Hercules.....	70@70/100
Taft's Vise Wrench.....	55@100/3%
The Favorite Pocket.....	* doz., \$4.00, 40%
Walker's.....	55@85
Webster's Pat. Combination.....	25%

Wringers, Clothes

Am. Wringer Co.'s list, July 1, '93.....	2% cash
Colby Wringer Co., list Sept. 1, '91.....	2% cash
Lovell Mfg. Co., list July 1, 1892.....	2% cash
Peckham's Mfg. Co., list Feb. 1892.....	2% cash
National Wringer & Mfg. Co., list June 1, 1892.....	2% cash

Wrought Goods—

Staples, Hooks, &c., list, March 17, 1893.....	85@100/85@100
--	---------------

Paints, Oils and Colors.—Wholesale Prices.**Animal and Vegetable****Oils—**

Linseed, City, raw... per gal.	52 @ 51
Linseed, City, boiled.....	55 @ 57
Linseed, Western, raw.....	52 @ 51
Lard, City, Extra Winter.....	65 @ 66
Lard, City, Prime.....	65 @ 66
Lard, City, No. 1.....	65 @ 66
Lard, City, No. 2.....	65 @ 66
Lard, Western, prime.....	70 @ 70
Cotton-seed, Crude, prime.....	28 @ 28
Cotton-seed, Crude, off grades.....	25 @ 27
Cotton-seed, Summer Yellow, prime.....	33 @ 33
Cotton-seed, Summer Yellow, off grades.....	31 @ 32
Sperm, Crude.....	62 1/2 @ 62 1/2
Sperm, Natural Spring.....	63 @ 65
Sperm, Bleached Spring.....	68 @ 70
Sperm, Natural Winter.....	68 @ 70
Sperm, Bleached Winter.....	73 @ 75
Whale, Crude.....	44 @ 45
Whale, Natural Winter.....	44 @ 45
Whale, Bleached Winter.....	47 @ 48
Whale, Extra Bleached.....	49 @ 50
Sea Elephant, Bleached Winter.....	49 @ 50
Menhaden, Crude, Sound.....	32 @ 32
Menhaden, Crude, Southern.....	32 @ 32
Menhaden, Light Pressed.....	36 @ 38
Menhaden, Bleached W'ter.....	41 @ 42
Menhaden, Extra Bleached.....	44 @ 45
Tallow, City, prime.....	50 @ 50
Tallow, Western, prime.....	48 @ 48
Cocanut, Ceylon.....	5 1/2 @ 5 1/2
Cocanut, Cochiti.....	6 1/2 @ 6 1/2
Cod, Domestic.....	38 @ 40
Cod, Foreign.....	42 @ 45
Red Saponified.....	35 @ 38
Red Saponified.....	35 @ 38
Bank.....	4 1/2 @ 5
Straits.....	39 @ 39
Olive, Italian, bbls.....	68 @ 62
Neatsfoot, prime.....	60 @ 65
Palm, prime, Lagos.....	5 1/2 @ 6

Mineral Oils—

Black, 20 gravity, 25 @ 30 cold test..... per gal	7 @ 7 1/2
Black, 20 gravity, 15 cold test.....	7 1/2 @ 8
Black, 20 gravity, summer.....	6 @ 6 1/2
Cylinder light, filtered.....	14 @ 16

Cylinder, dark, filtered.....	10 @ 13
Paraffine, 23 1/2 @ 24 gravity.....	11 @ 12
Paraffine, 25 gravity.....	10 @ 11
Paraffine, 28 gravity.....	7 1/2 @ 8
Paraffine, red.....	9 1/2 @ 10 1/2

Paints and Colors—

Barytes, Foreign, 10 ton.....	\$22.00 @ 24.00
Barytes, Amer. floated.....	29.00 @ 32.00
Barytes, Amer. No. 1.....	10.00 @ 18.00
Barytes, Amer. No. 2.....	13.00 @ 15.00
Barytes, Amer. No. 3.....	11.00 @ 12.00
Blue, Celestial.....	40 @ 50
Blue, Chinese.....	25 @ 40
Blue, Prussian.....	25 @ 40
Blue, Ultramarine.....	8 @ 25
Brown, Spanish.....	1 1/2 @ 1
Brown, Vandyke, Amer.....	3 @ 3 1/2
Brown, Vandyke, English.....	6 @ 8
Carmine, No. 40, in bulk.....	2.75 @ 2.75
Carmine, No. 40, in boxes.....	2.85 @ 2.85
Carmine, No. 40, in ounce bottles.....	3.75 @ 3.75
Chalk, in bulk.....	1.75 @ 2.00
Chalk, in bbls., # 100 lb.....	33 @ 40
China Clay, English.....	10 @ 13.00
Cobalt Oxide, prep'd.....	9.00 @ 11.00
Cobalt Oxide, black.....	1.90 @ 1.90
Cobalt Oxide, black, less 100 lb.....	1.96 @ 1.96
Green, Paris, in 100 lb.....	10 @ 10 1/2
Green, Paris, 170 @ 175 lb.....	10 1/2 @ 11
Green, Paris, small pack.....	12 @ 17
Green, Chrome, ordinary.....	6 @ 12
Green, Chrome, pure.....	22 @ 25
Lead, Eng., B.R. white.....	7 @ 8
Lead, Ann. White, dry or in oil.....	6 1/2 @ 6 1/2
Kegs, lots less than 500 lb.....	5 1/2 @ 6
Kegs, lots 500 lb to 5 tons.....	5 1/2 @ 6
Kegs, lots 5 tons to 12 tons.....	5 1/2 @ 5 1/2
Kegs, lots 12 tons and over.....	5 1/2 @ 5 1/2
Lead, White, in oil, 25 lb tin.....	.. @ 1 1/2
Lead, White, in oil, 12 1/2 lb tin.....	.. @ 1 1/2
Lead, White, in oil, 12 1/2 lb tin.....	.. @ 1 1/2
Lead, White, in oil, 1 to 5 lb assorted tins, add to keg price.....	.. @ 2 1/2
Lead, Red, bbls. and 1/2 bbls.....	6 1/2 @ 6 1/2
Lead, Red, kegs.....	6 1/2 @ 6 1/2
Litharge, kegs.....	5 1/2 @ 6 1/2
Litharge, bbls. and 1/2 bbls.....	5 1/2 @ 6 1/2

TERMS, &c.—Lead and Litharge.—On lots of 500 lb or over, 60 days' time or 2 1/2 % discount for cash if paid within 15 days of date of invoice.

Ocher, Rochelle.....	1.35 @ 1 1/2
Ocher, French Washed.....	1 1/2 @ 2 1/2
Ocher, German Washed.....	1 1/2 @ 3
Ocher, American.....	1 1/2 @ 1 1/2
Orange Mineral, English.....	8 1/2 @ 9
Orange Mineral, French.....	10 @ 10 1/2
Orange Mineral, German.....	8 1/2 @ 9
Orange Mineral, American.....	8 1/2 @ 8 1/2
Paris White, English Cliff.....	1.00 @ 1.15
Paris White, American.....	65 @ 75
Red, Indian, English.....	5 1/2 @ 7
Red, Indian, American.....	2 @ 6 1/2
Red, Turkey.....	9 @ 14
Red, Tuscan.....	9 @ 11
Red, Venetian, American.....	1.00 @ 1.10
Red, Venetian, English.....	1.20 @ 1.35
Sienna, Italian, Burnt and Powder.....	4 @ 5
Sienna, Ital., Burnt Lumps.....	1 1/2 @ 3 1/2
Sienna, Ital., Raw, Powder.....	4 1/2 @ 5 1/2
Sienna, Ital., Raw, Lumps.....	1 1/2 @ 3 1/2
Sienna, American, Burnt and Powdered.....	1 1/2 @ 1 1/2
Talc, French.....	1 @ 1 1/2
Talc, American.....	1 1/2 @ 1 1/2
Terra Alba, Fr'ch, # 100 lb.....	95 @ 1.25
Terra Alba, English.....	70 @ 80
Terra Alba, American No. 1.....	65 @ 75
Terra Alba, American No. 2.....	45 @ 50
Umber, Turkey, Burnt and Powdered.....	3 1/2 @ 4
Umber, Turkey, Raw and Powdered.....	3 1/2 @ 4
Umber, Turkey, Bnt. Amer.....	1 1/2 @ 1 1/2
Umber, Turkey, R'w Amer.....	1 1/2 @ 1 1/2
Yellow, Chrome.....	10 @ 25
Vermilion, American Lead.....	11 @ 12
Vermilion, Quicksilver, bulk.....	43 @ ..
Vermilion, Quicksilver, bags.....	44 @ ..
Vermilion, Quicksilver sm'r.....	.. @ ..
Vermilion, English Import.....	80 @ 85
Vermilion, Imitation, Eng.....	8 @ 30
Vermilion, Trieste.....	90 @ 92 1/2
Vermilion, Chinese.....	82 1/2 @ 85
Whiting, common, # 100 lb.....	37 1/2 @ 42 1/2
Whiting Gliders.....	45 @ 55

Zinc, American, dry.....	# B 3 1/2 @ 4 1/2
Zinc, French, Red Seal.....	7 1/2 @ ..
Zinc, French, Green Seal.....	9 @ ..
Zinc, French, V. M. X.....	.. @ 7
Zinc, Antwerp, Red Seal.....	7 1/2 @ ..
Zinc, Antwerp, Green Seal.....	7 1/2 @ ..
Zinc, German, L. Z. O.....	6 1/2 @ 7 1/2
Zinc, V. M. in Poppy Oil, G. Seal, lots of 1 ton and over.....	10 1/2 @ 11 1/2
lots less than one ton.....	11 @ 11 1/2
Zinc, V. M. in Poppy Oil, Red Seal.....	.. @ ..
lots of 1 ton and over.....	10 @ 10 1/2
lots of less than 1 ton.....	10 1/2 @ 10 1/2
Discounts.—French Zinc.—Discounts to buyers of 10 bbl. lots of one or assorted grades, 1 1/2; 25 bbls., 2 1/2; 50 bbls., 4 1/2. No discount allowed on less than bbl. lots.	

Colors in Oil—

Black, Drop, Frankfurt.....	25 @ 30
Black, Drop, English.....	12 @ 15
Black, Drop, Domestic.....	7 @ 10
Black, Lampblack, Best.....	20 @ 35
Black, Lampblack, Common.....	7 @ 13
Black, Ivory.....	4 @ 13
Blue, Chinese.....	35 @ 40
Blue, Prussian.....	20 @ 45
Blue, Ultramarine.....	12 @ 18
Brown, Vandyke.....	7 @ 12
Green, Chrome.....	16 @ 13 1/2
Green, Paris.....	7 @ 14
Sienna, Raw.....	7 @ 14
Sienna, Burnt.....	7 @ 14
Umber, Raw.....	7 @ 10
Umber, Burnt.....	7 @ 10

Putty—

In barrels and 1/2 bbls.....	.013 @ .013
In tubs.....	.015 @ .015
In tin cans.....	.014 @ .024
In bladders.....	.013 @ .024

Spirits Turpentine—

In regular bbls.....	@ 30 1/2
In machine bbls.....	@ 31

Glue—

Low Grade.....	# B 8 @ 10
Cabinet.....	12 @ 14
Medium White.....	13 @ 15
Extra White.....	17 @ 20
French.....	10 @ 22
English.....	10 @ 16
Irish.....	12 @ ..

THE IRON AGE.

The oldest paper in the world devoted to the interests of the Hardware, Iron and Metal Trades, and a standard authority on all matters relating to those branches of industry.

RATES OF SUBSCRIPTION: INCLUDING POSTAGE.**UNITED STATES AND BRITISH AMERICA.**

Weekly Edition, Issued every THURSDAY MORNING.....	\$4.50 a year.
Semi-Monthly Edition, FIRST and THIRD THURSDAYS of every month.....	2.30 "
Monthly Edition FIRST THURSDAY of every month.....	1.15 "

ALL OTHER COUNTRIES.**Per Annum, Postpaid.**

Weekly Edition: \$5.00 = 51 = 25 francs = 20 marks = 11 florins = 6 roubles (coin) = 25 lire = 20 pesetas.	
Semi-Monthly Edition: \$2.50 = 10 = 12 1/2 francs = 10 marks = 6 florins = 3 roubles (coin) = 12 1/2 lire = 10 pesetas.	
Monthly Edition: \$1.25 = 5 = 6 1/4 francs = 5 marks = 3 florins = 1 1/2 roubles (coin) = 6 1/4 lire = 5 pesetas.	

RATES OF ADVERTISING: ONE SQUARE (12 LINES, ONE INCH).

ONE INSERTION.....	\$2.00
ONE MONTH.....	7.50
THREE MONTHS.....	17.50

SIX MONTHS.....	\$30.00
ONE YEAR.....	50.00

Rates for larger spaces quoted on application.

New York (Main Office),	96-102 Reade Street,
Philadelphia,	220 South Fourth Street,
Pittsburgh,	Room 509, Hamilton Building.
Chicago,	59 Dearborn Street, cor. Randolph,
Cincinnati,	Rooms 22-24 Pickering Building,
St. Louis,	Bank of Commerce Building,
Boston,	146 Franklin Street,
Cleveland,	312 The Cuyahoga,

BRITISH AGENCY: Office of The Ironmonger, 42 Cannon St., London.

AUSTRALIAN OFFICES: Melbourne, 231 Elizabeth St.; Sydney, 234 Clarence St.

Remittances should be made by draft, payable to the order of DAVID WILLIAMS, on any banking house in the United States or Europe, or by P. O. Money Order on New York. When these cannot be obtained, postage stamps of any country will be received.

Newsdealers or Booksellers in any part of the world may obtain The Iron Age through The American News Company, New York, U. S. A. The International News Company, New York, U. S. A. and London, England; or The San Francisco News Company, San Francisco, Cal., U. S. A.

Entered at the Post Office, New York as Second-Class Matter

MARCH 28, 1894.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

Bar Iron from Store—

Digitized by Google

This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

GoogleTM books

<https://books.google.com>

